Lower urinary tract disease,
with focus on incontinence

Lauren Carvalho, DVM, DACVIM (SAIM)
Small Animal Internist
Cape Cod Vet Specialists

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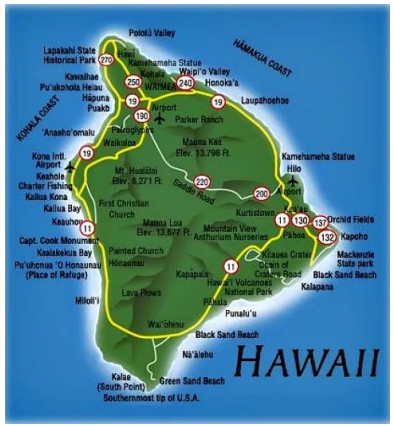
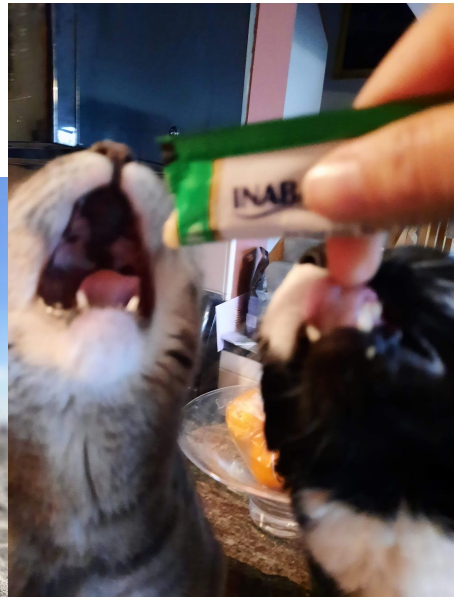
Who am I?

- Originally from Hilo, Hawaii
- Currently living in Sagamore Beach area with husband, 2 golden retrievers, and 2 cats





Who am I?

- Tufts University,
  Cummings School of Vet Medicine
  - Veterinary school, 2015-2018
  - SA rotating internship, 2018-2019
  - SA IM residency, 2019-2022
- CCVS, Buzzards Bay
  - Internist, 2022-present
- Special interests:
  - Nephrology and urology
  - Minimally invasive procedures

Tufts University | Cummings School of Veterinary Medicine

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Incontinence

- Inability to voluntarily control urine storage and/or voiding.
- Severe QOL issue for both pets and owners
- Can be a reason for surrender or euthanasia

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Plan

- Pathophysiology of urination
- The incontinence work-up
- Diagnosis/tx of:
  - Disorders of storage
    - USMI
    - Ectopic ureters
    - Pelvic bladder
    - Urethral hypoplasia
  - Disorders of emptying
    - Urethral blockages
    - Detrusor atony
    - Detrusor urethral dyssynergia

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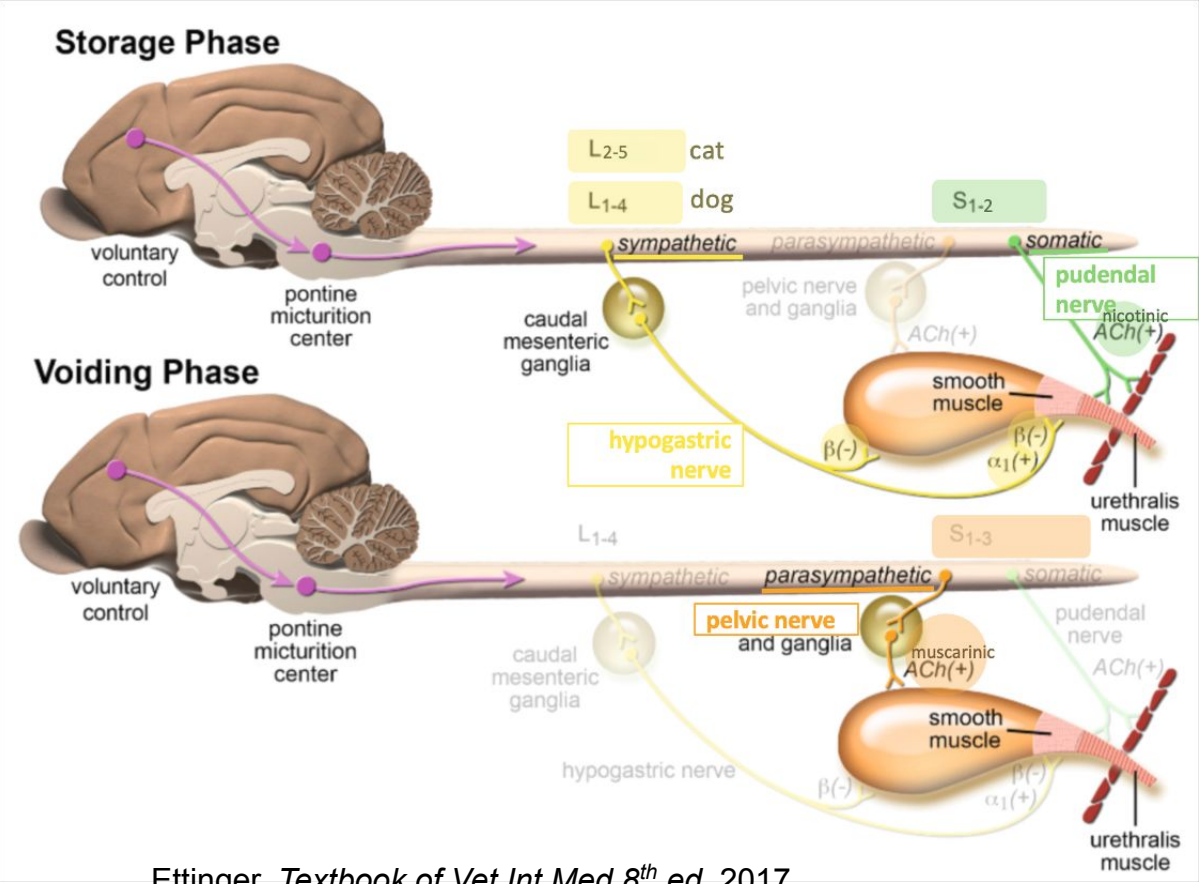
Pathophysiology of urination

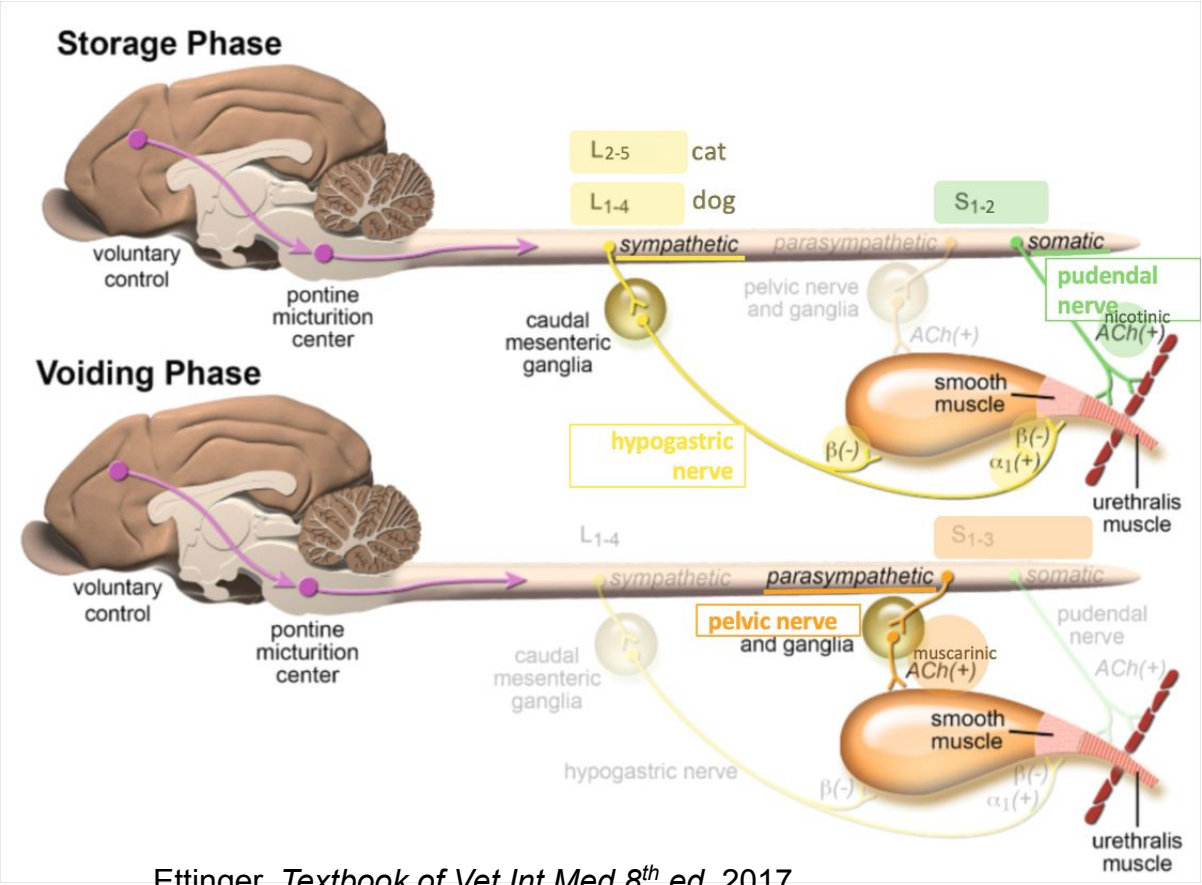
1. Sympathetic
   - Storage
2. Parasympathetic
   - Voiding
3. Somatic (skeletal)
   - Conscious



Ettinger, *Textbook of Vet Int Med 8th ed*, 2017

Pathophysiology of urination

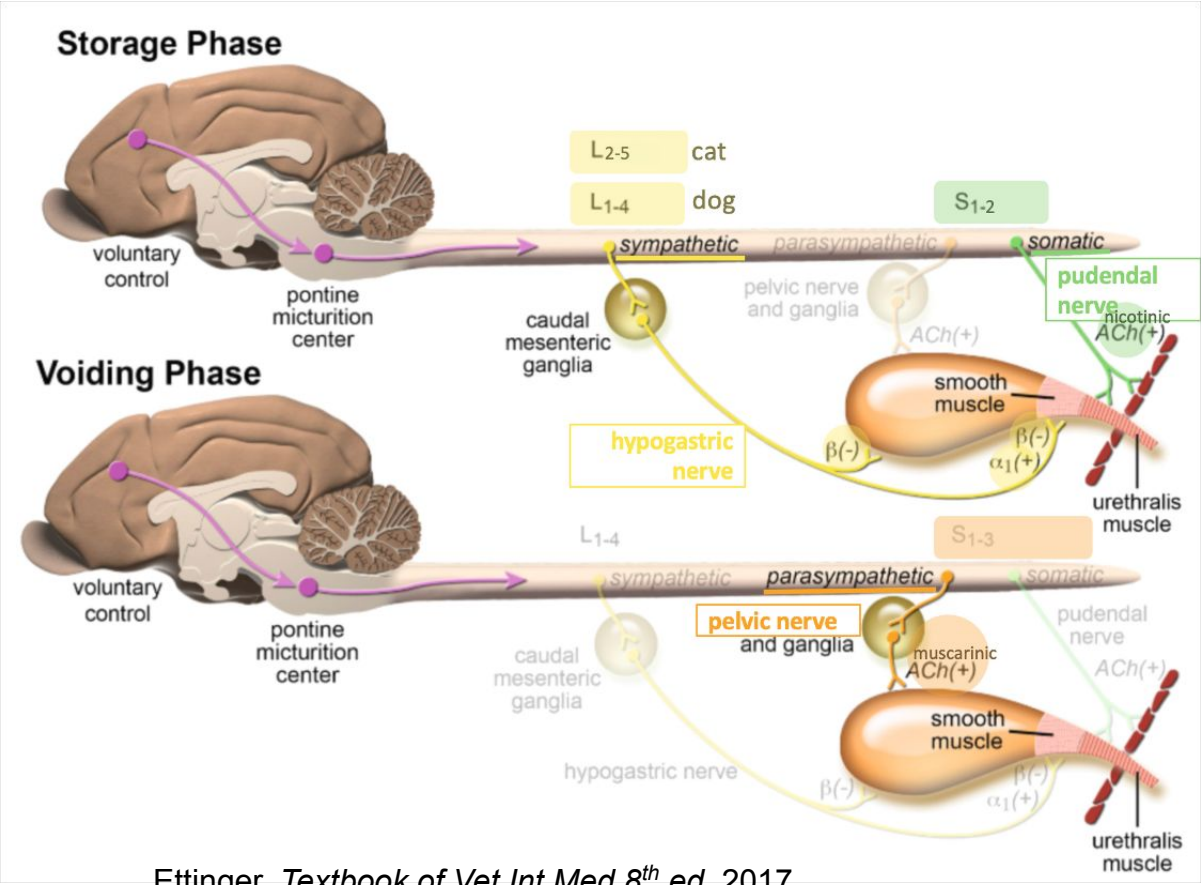
- Sympathetic: Hypogastric n, L1-L4
  - Urine storage
  - Beta-adrenergic Rs in bladder relax the detrusor
  - Alpha-adrenergic Rs in bladder neck/internal urethral sphincter contract



Ettinger, *Textbook of Vet Int Med 8th ed*, 2017

Pathophysiology of urination

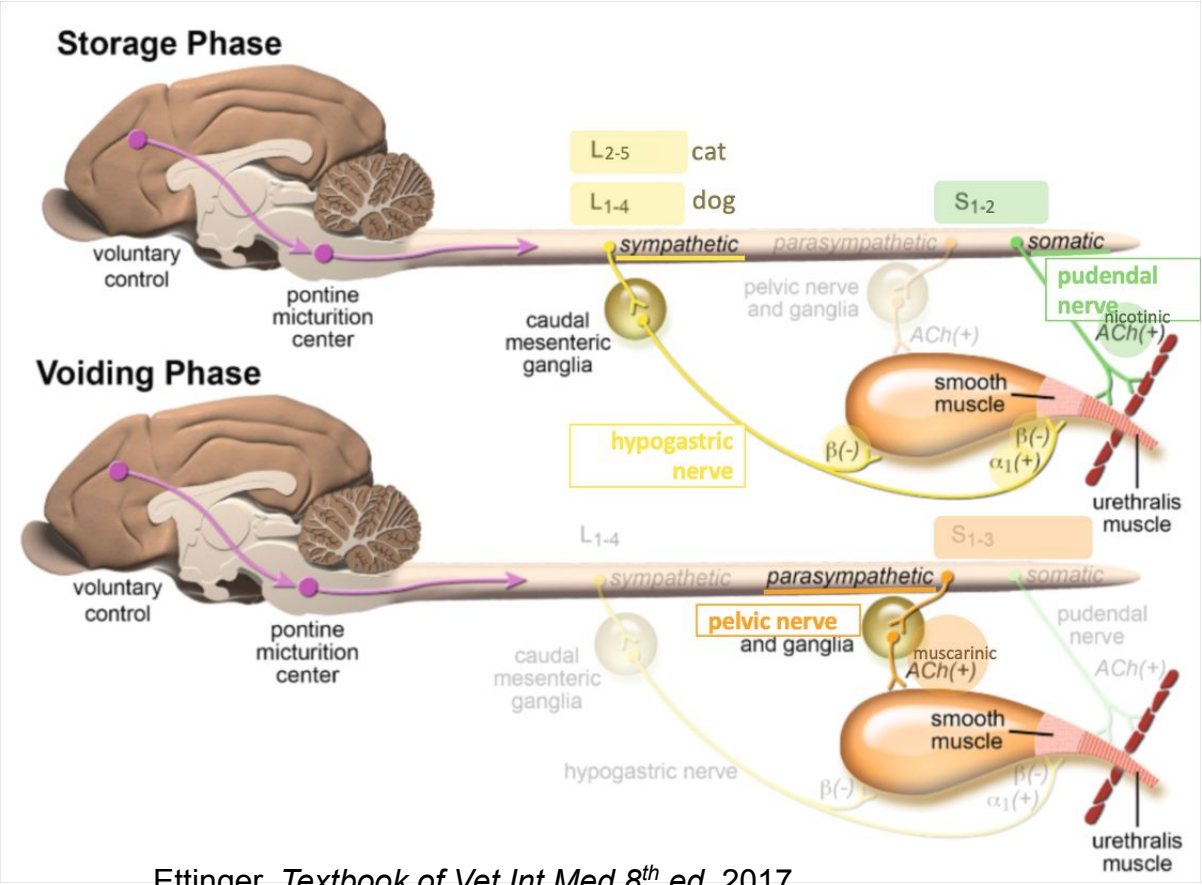
- Parasympathetic: Pelvic n, S1-S3
  - Urine voiding
  - Cholinergic Rs in bladder contract the detrusor



Ettinger, *Textbook of Vet Int Med 8th ed*, 2017

Pathophysiology of urination

- Somatic: Pudendal n, S1-S2
  - Conscious control
  - Nicotinic Rs contract external urethral sphincter



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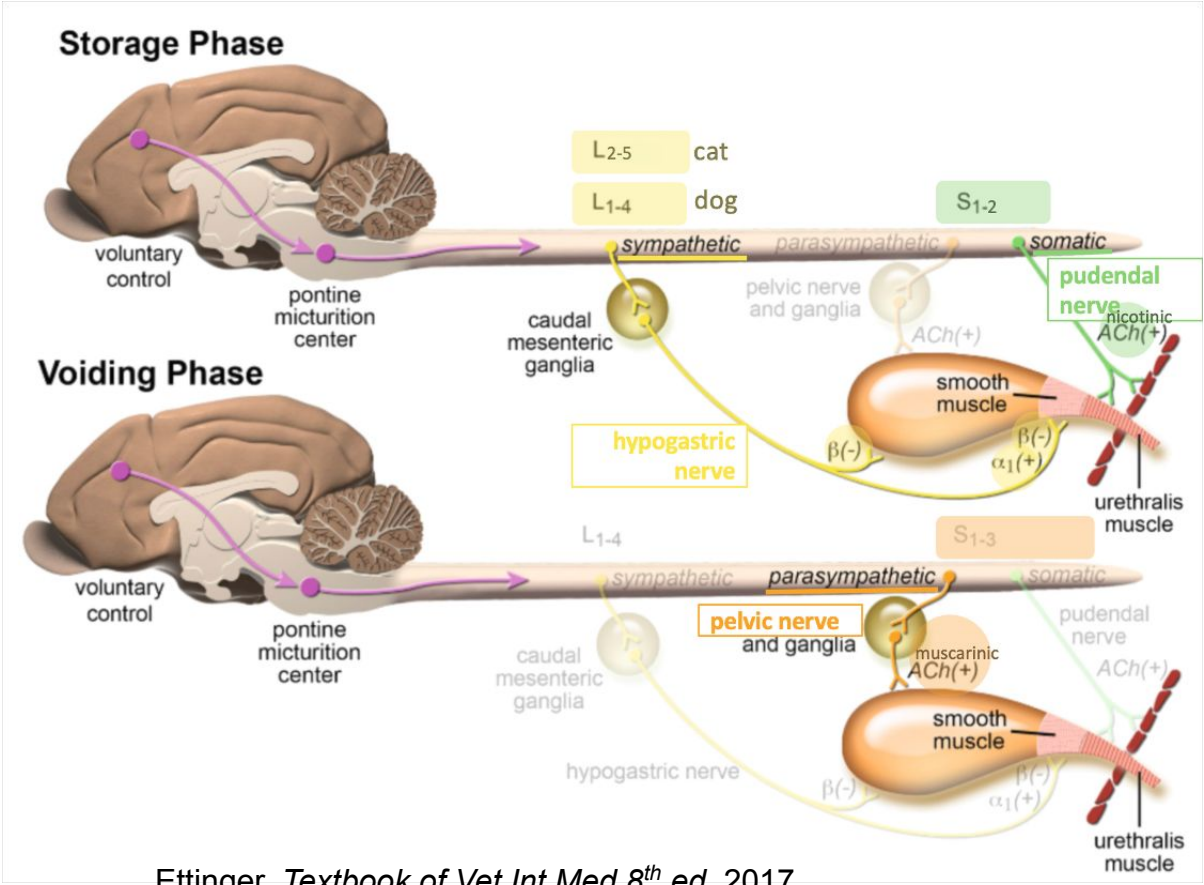
**** Note that pudendal nerves also control anal tone! More reason to get a good neuro exam on these dogs. ****



Ettinger, *Textbook of Vet Int Med 8th ed*, 2017

What could go wrong?

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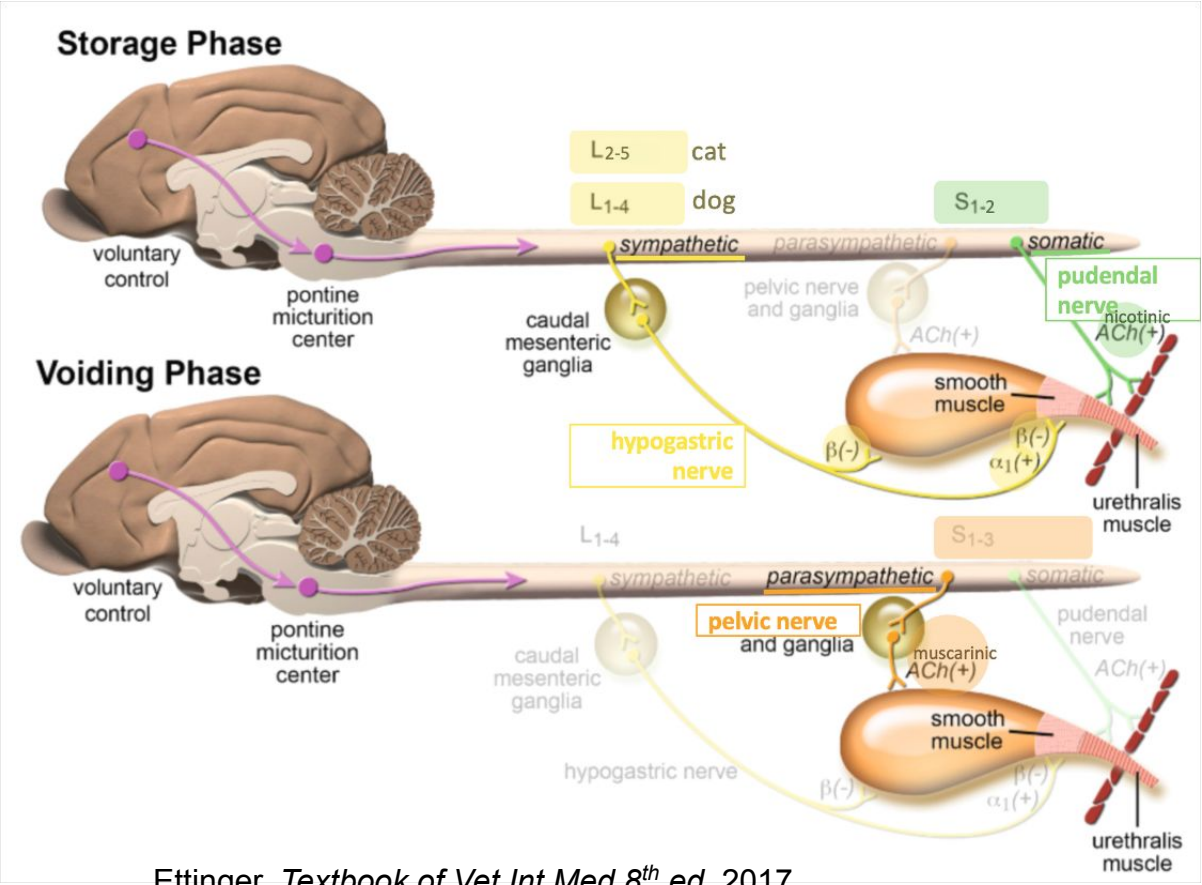
Neurologic disease

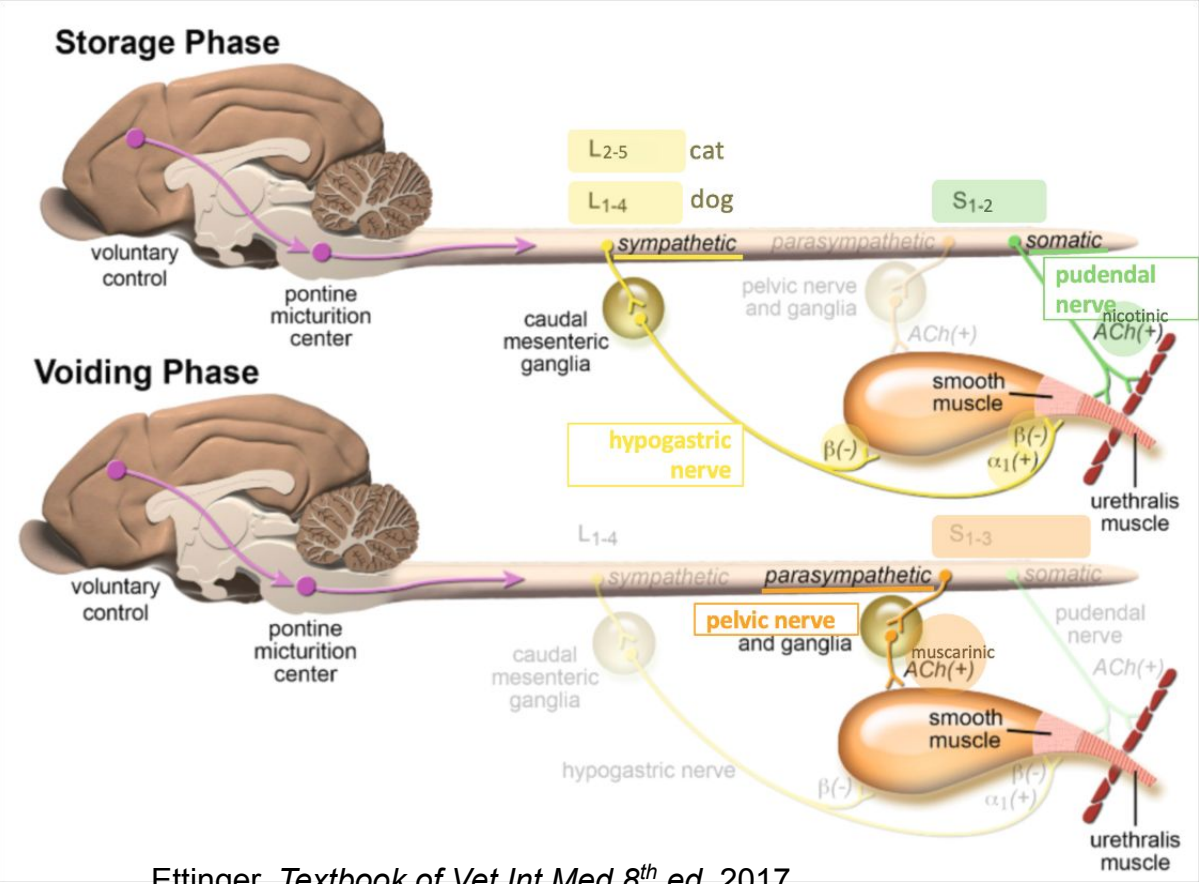
- Upper motor neuron lesion:
  - Lesion cranial to sacral segments
  - Functional urethral obstruction, large and difficult to express bladder
  - Hyperexcitability of the urethral sphincter due to lack of inhibition of the pudendal n.



Ettinger, *Textbook of Vet Int Med 8th ed*, 2017

Neurologic disease

- Lower motor neuron lesion:
  - Lesion at S1-3, pelvic n, pudendal n
  - Atonic bladder, easily expressed -> overflow incontinence



Ettinger, *Textbook of Vet Int Med 8th ed*, 2017

Non-neurologic diseases

Disorders of storage

- Urethral sphincter mechanism incompetence
- Ectopic ureters
- Pelvic bladder
- Detrusor hyperreflexia
- Urethral hypoplasia
- Vestibulovaginal urine pooling

Disorders of emptying

- Urethral blockages: TCC, prostatic diseases, urolithiasis, urethral stricture, proliferative urethritis, FLUTD
- Detrusor atony
- Detrusor urethral dyssynergia

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The incontinence work-up

Step 1: Thorough medical history

Incontinence

- Dribbling urine at rest or sometimes continuously
- Submissive urination
  - Technically incontinence but more behavioral

Inappropriate urination

- PU/PD
- Stranguria
- Pollakiuria
- Marking
- Housebreaking issues

https://www.marvistavet.com/urinary-incontinence.pml

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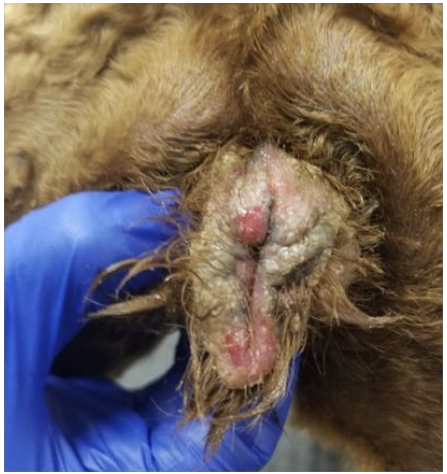
The incontinence work-up

Step 2: Physical exam

- Pyoderma, urine scalding, wet rear
- Vulvar conformation



The incontinence work-up

Step 2: Physical exam

- Rectal (assess prostate in males, assess urethra in all dogs)
- Observe pet urinating and palpate or AFAST bladder afterwards to see if able to empty
- In puppies, if 1 congenital abnormality, look for others
  - Eg. SAS, renal dysplasia, hooded vulva, PSS, cleft palates
- Good neuro exam, especial anal sphincter tone and lower back pain

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The incontinence work-up

Step 3: Diagnostics

Minimum database

- Cysto urinalysis/culture
- CBC/Chem
- Abdominal imaging

Additional steps:

- Trial of medical management
- Cystoscopy

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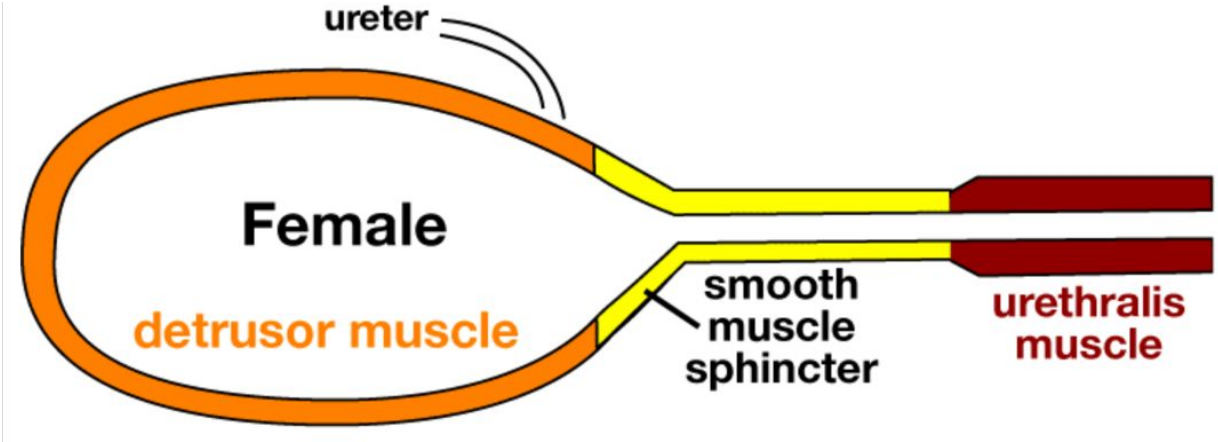
Urethral sphincter mechanism incompetence (USMI)

- Weakness of the urethral smooth muscle sphincter, resulting in incontinence primarily at rest



http://vanat.cvm.umn.edu/

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Urethral sphincter mechanism incompetence (USMI)

- Most common type of incontinence in dogs
- Young to middle-aged female dogs (up to 20%), less commonly young males
- Large > small breeds
  - >20kg 30%, <20kg 9%
- Congenital vs acquired (avg ~3y after OVH)
- Urethral pressure profile not commonly done, usually a diagnosis of exclusion

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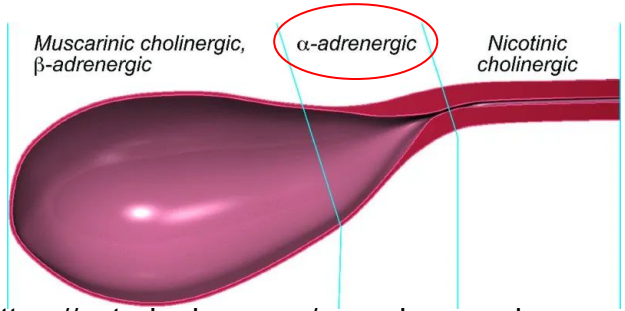
USMI medical management

- Phenylpropanolamine (PPA, Proin)
  - **Stimulates α1 adrenergic Rs** in urethra to contract smooth mm
  - Effective in 74-90% of USMI dogs
  - Tachyphylaxis is reported, so start with lowest effective dose as may need to increase dose over the years
  - SE: GI upset (**always** give with food), hypertension (monitor), restlessness/anxiety/aggression (rare)



https://veteriankey.com/neurology-and-neuropharmacology-of-normal-and-abnormal-urination/

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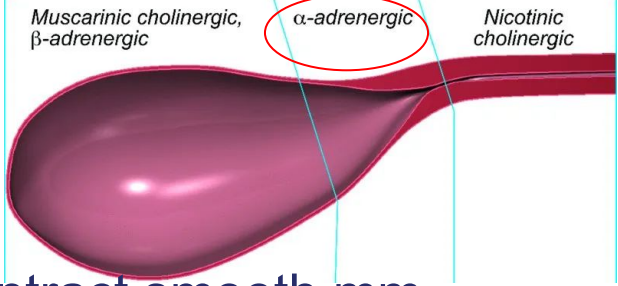
USMI medical management



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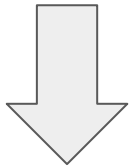
  - Tachyphylaxis is reported, so start with lowest effective dose as may need to increase dose over the years
  - SE: GI upset (always give with food), hypertension (monitor), restlessness/anxiety/aggression (rare)
- Estrogens (DES, estriol)
  - **Increase number and sensitivity of α1 adrenergic Rs** in urethra
  - Effective in 40-85% of USMI dogs
  - SE: Myelosuppression (monitor), vulvar swelling, mammary development, behavior changes, prostatic metaplasia in males

** Complementary MOAs, very effective in combo **

USMI medical management

- Testosterone cypionate
  - 1.5mg/kg IM q4 weeks
  - Efficacy not well-established
  - Good to excellent response in 38% of dogs (Palerme, 2017)
  - SE: Behavior change, aggression, perianal adenoma, prostatic hyperplasia

15-35% of dogs with USMI fail medical management…



Cystoscopy

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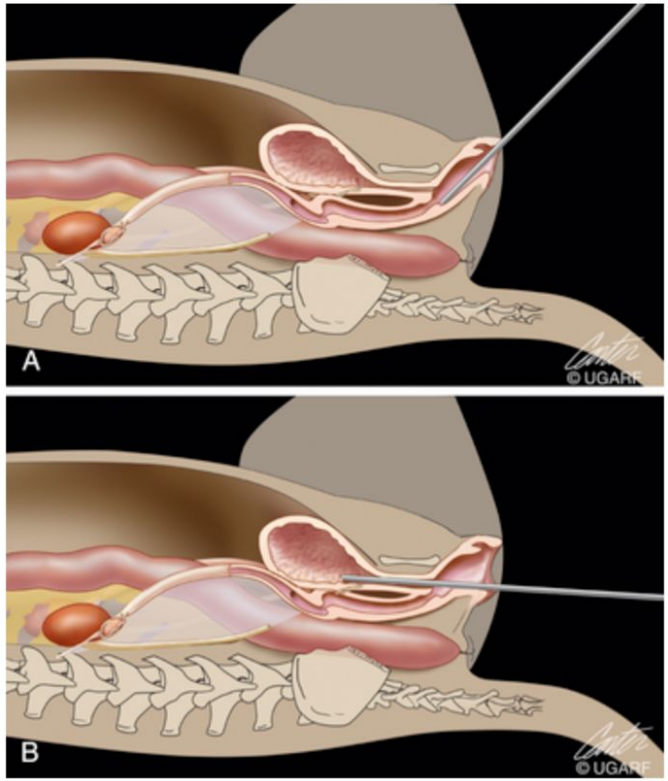
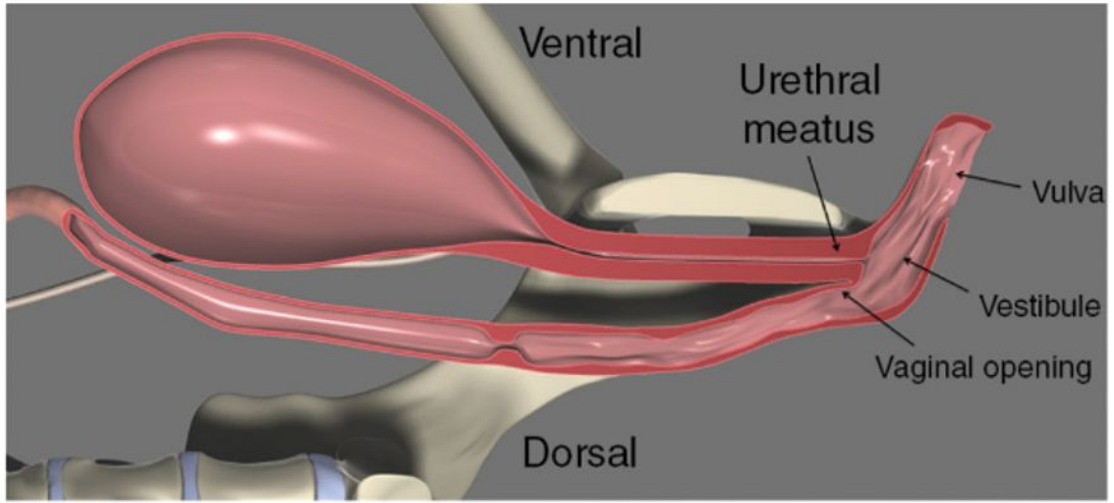
Normal cystoscopy - anatomy review



https://veteriankey.com/cystoscopy/



Veterinary Image-Guided Interventions, First Ed. Edited by Chick Weisse and Allyson Berent.

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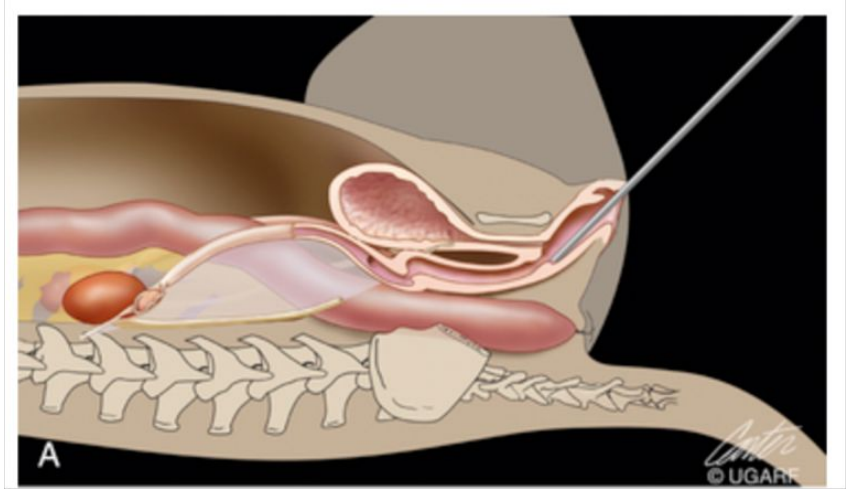
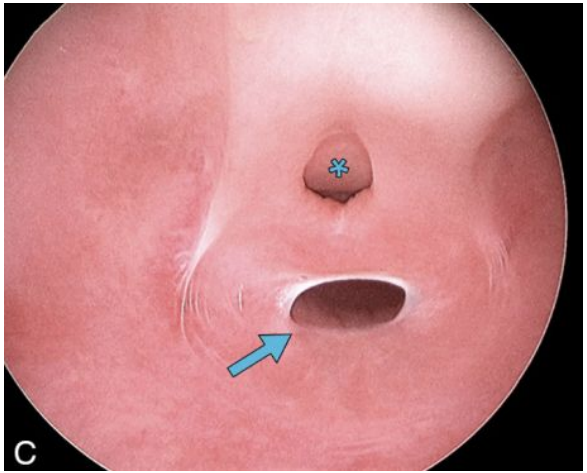
Normal cystoscopy - vestibule



https://veteriankey.com/cystoscopy/



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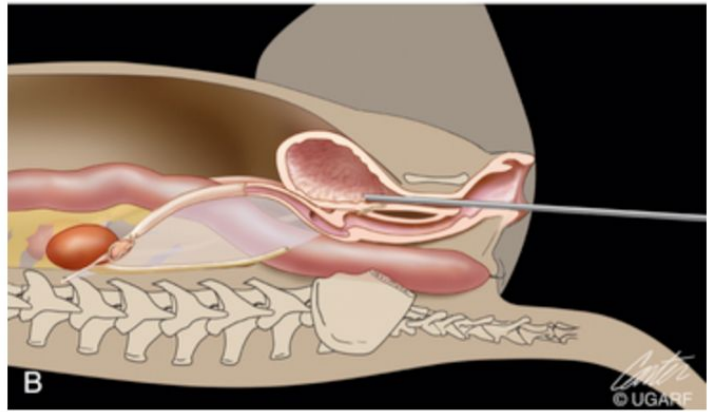
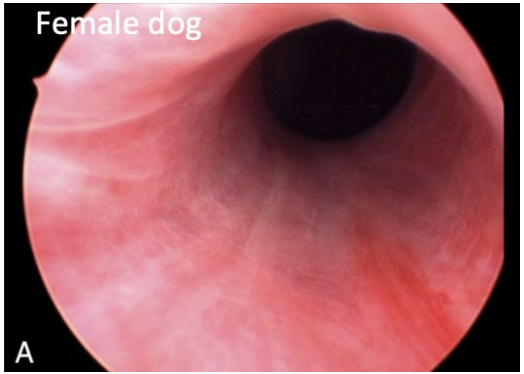
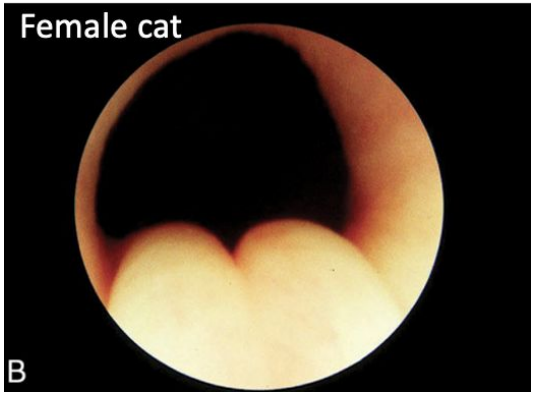
Normal cystoscopy - urethra



https://veteriankey.com/cystoscopy/





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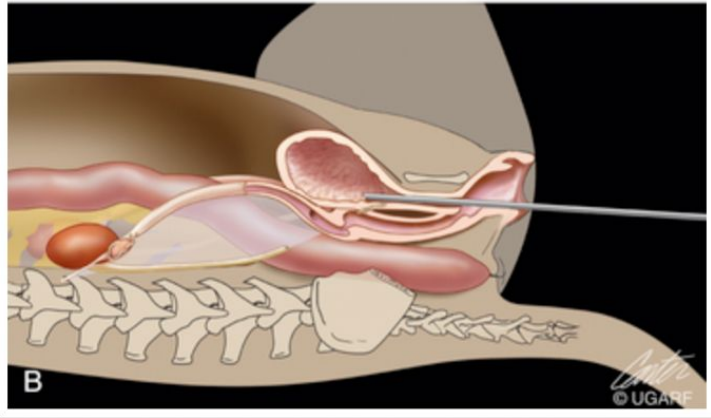
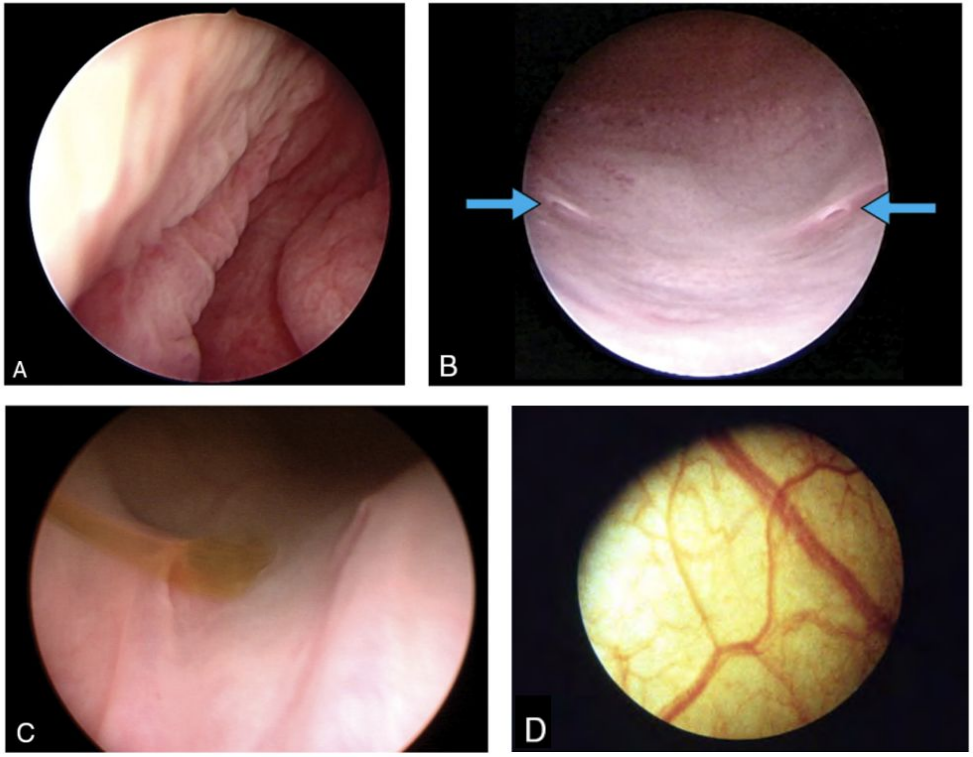
Normal cystoscopy - bladder



https://veteriankey.com/cystoscopy/



Refractory USMI - collagen bulking agents

- Patient selection
  - Failed or intolerant of medical management
  - **No UTI! Neg urine culture within 1 week of procedure**
  - USMI without concurrent lower urinary tract disease
- Complications
  - Reaction to material, abscess formation, bleeding, may not help
- Expected outcomes
  - Benefit if seen typically lasts 10-18 months (Weisse & Berent Eds., 2015).

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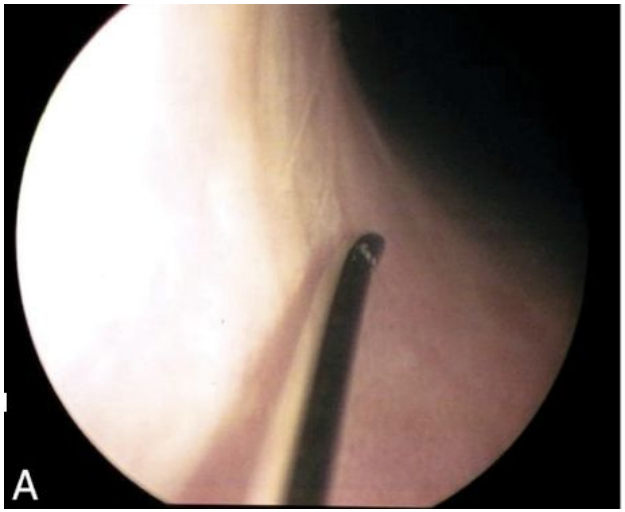
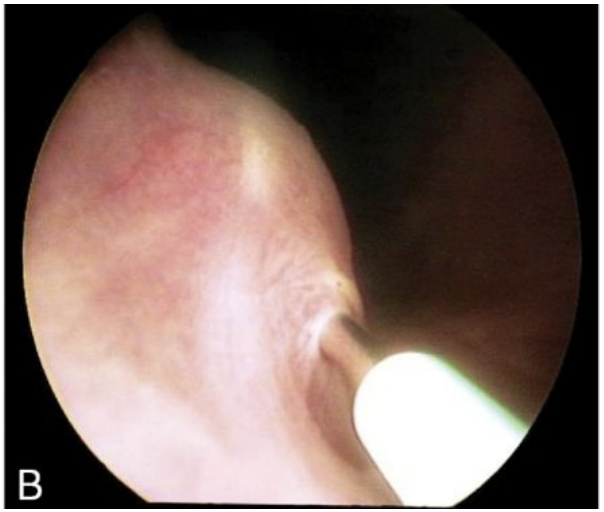
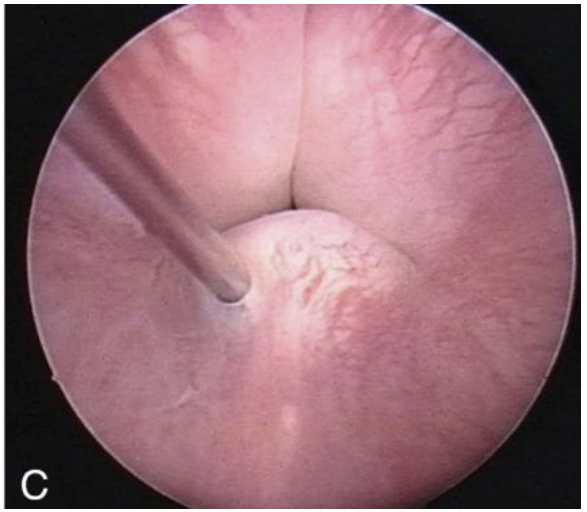
Cystoscopic injection of collagen bulking agent







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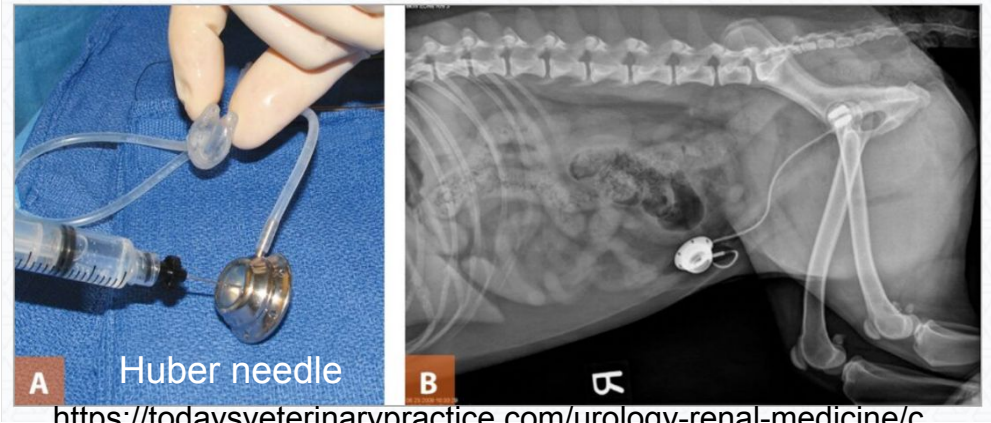
Refractory USMI - hydraulic occluder

- Artificial urethral sphincter
- Silicone inflatable cuff placed around the proximal urethra, with SQ access/injection port



https://todaysveterinarypractice.com/urology-renal-medicine/canine-urethral-incontinence/

https://norfolkvetproducts.com/products/aus/

Hydraulic occluder - management

- No filling for 6 wks post-op.
- Scope at 6 weeks to establish volumes for 25%, 50%, 75%, 100% occlusion for the individual.
- If unable to scope, could infuse at 0.1mL increments, ensuring ability to urinate after each filling.

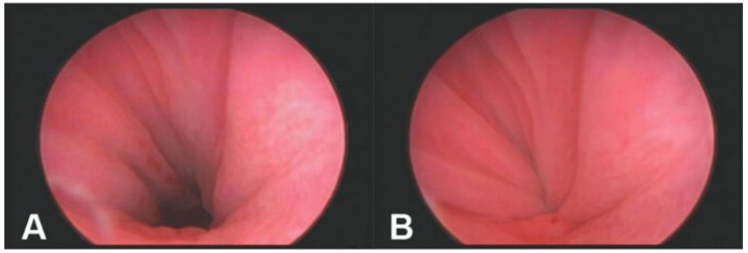


Figure 3 Endoscopic images during urethroscopy performed during HO inflation in a female dog. Urethral lumen before (A) and after (B) HO inflation showing the decreased diameter of the urethral lumen, after infusion of the silicone ring resulting in extraluminal compression.

Currao et al. Vet Surg 42, 2013: 440-447.

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Use of a Percutaneously Controlled Urethral Hydraulic Occluder for Treatment of Refractory Urinary Incontinence in 18 Female Dogs

Veterinary Surgery 42 (2013) 440–447

Rachael L. Currao[1], DVM, Allyson C. Berent[2], DVM, Diplomate ACVIM, Chick Weisse[1,2], VMD, Diplomate ACVS, and Philip Fox[3], DVM, MS, Diplomate ACVIM & ECVIM (Cardiology), ACVECC

- All dogs improved to some degree, follow-up of 32 mo
  - Residual incontinence assoc with severe anatomical defects such as intrapelvic/hypoplastic bladders and/or hypoplastic urethras
- ~1/3 did not need inflation
- 61% continued PPA after occluder placement
- COMPLIANCE
  - 92% functional continence with compliant owners, compared to 67% when owners were noncompliant for inflations
- Urethral obstruction in 3/18 dogs

Hydraulic occluder - complications

Outcome after Placement of an Artificial Urethral Sphincter in 27 Dogs Veterinary Surgery 42 (2013) 12–18

Lauren Reeves, BS, Christopher Adin, DVM, Mary McLoughlin, DVM, MS, Kathleen Ham, DVM, and Dennis Chew, DVM

Department of Veterinary Clinical Sciences, The Ohio State University, Columbus, OH

- Partial urethral obstructions at 5 and 9 months (2/27 dogs), fibrotic reactions?

Artificial urethral sphincter in male dogs with urethral sphincter mechanism incompetence: 19 cases (2010–2017)

J Small Anim Pract. 2022 May;63(5):397-402.

M. Bohlen[1] and R. Nickel

- 60% improved, 53% completely continent
- **Higher complication rate** 56%, 31% required surgical correction
  - Urethral obstruction, persistent dyssynergia, fistula at port, port rotation

Hydraulic occluder - take-aways

- Salvage procedure when medical options fail, can be life-changing for these dogs and owners
- **Compliance** and appropriate follow-up is essential
- Complications can be severe and are more common in males. May require surgical correction, ballooning of strictures, removal of device

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Ectopic ureters

- Congenital disorder
  - One or both ureters emptying outside the bladder trigone
  - Abnormal differentiation of mesonephric and metanephric duct systems
- Incontinence since birth (later in males), sometimes lack of normal voiding
- Small bladder
- Breeds:
  - Goldens, labs, huskies, newfies, mini poodles, Entlebucher
- Look for other congenital anomalies
  - USMI, renal dysplasia, recessed vulva, pelvic bladder, SAS, PSS, cleft palates

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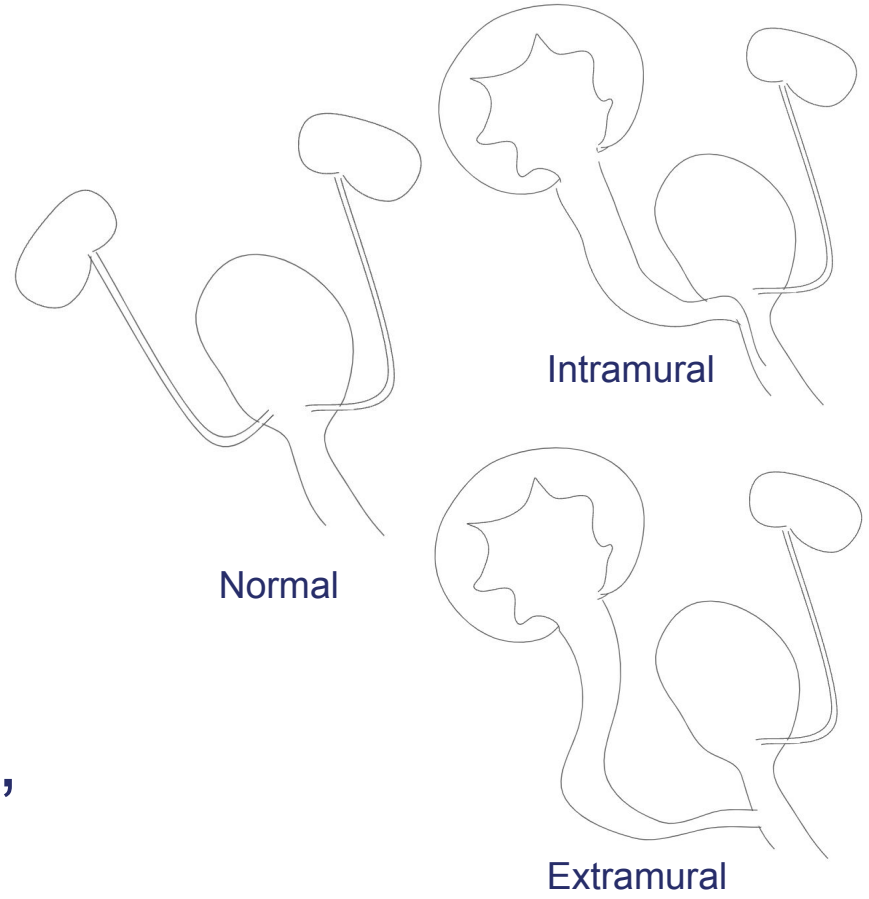
Ectopic ureters

- Female:male = 20:1
- Intramural (>95%) vs rare extramural in dogs
  - ~50/50 split in cats
- Unilateral vs bilateral
- Concurrent USMI >75%
- Hydronephrosis and/or hydroureter ~50%
- Pyelonephritis and cystitis, concurrent UTIs



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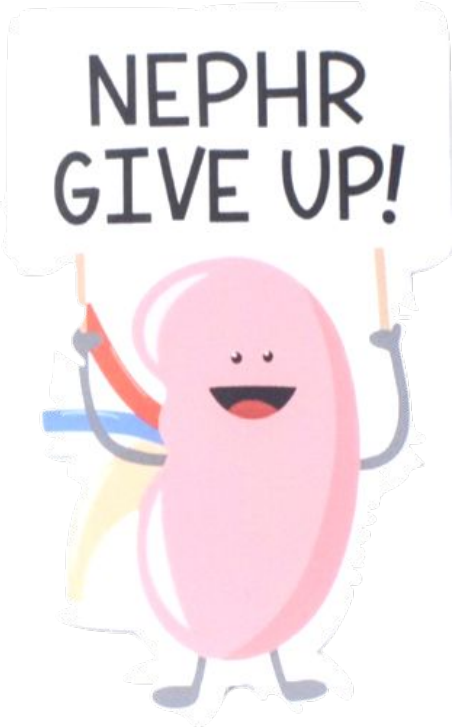

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Ectopic ureters - diagnostics

- CBC/Chem
- UA/UC
  - Need negative urine culture within 1 week of cystoscopy and laser ablation
- Abdominal ultrasound
  - ~50% sensitive for EU
  - Assess renal architecture, hydronephrosis, hydroureter
  - Bladder position (may need lateral AXR)
- Cystoscopy/laser ablation for intramural
  - 95-100% sensitive for EU

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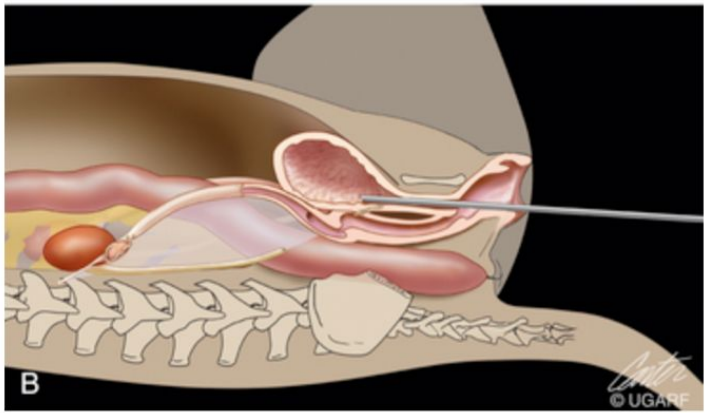
Ectopic ureters - cystoscopy



https://veteriankey.com/cystoscopy/

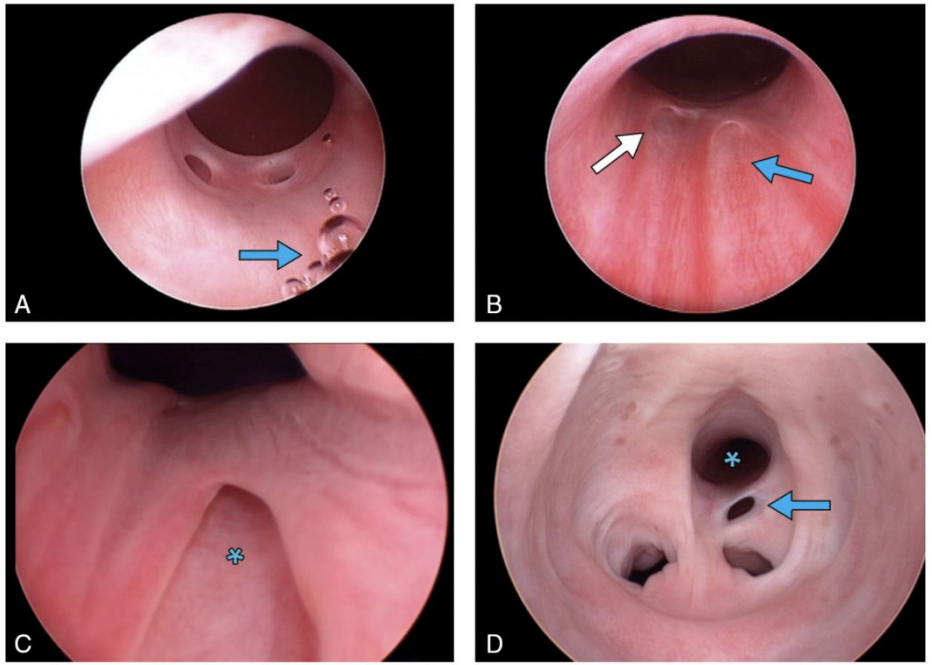
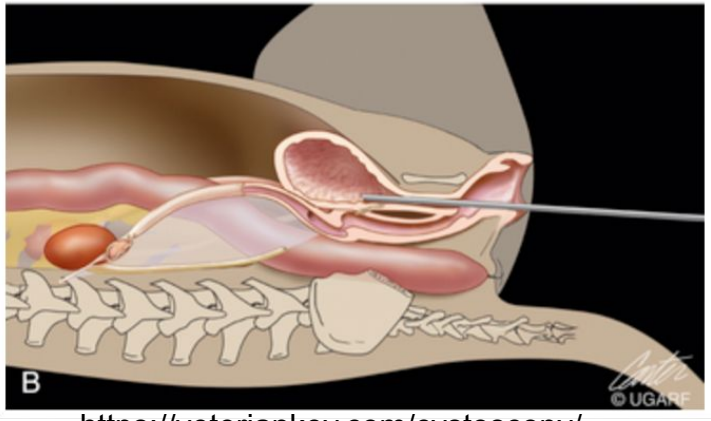


Figure 26.39 Endoscopic images of various ectopic ureters in the female dog. (A) Proximal ectopic ureteral openings in the proximal urethra. Small gas bubbles are indicated by the blue arrow. (B) Proximal ureteral openings (white arrow) with shallow troughs (blue arrow) ecoptically positioned in the proximal urethra. (C) Deep trough (asterisk) leading from an ectopic ureter. (D) Distal ectopic ureter (arrow), opening into the vestibule. Note the thick paramesonephric remnant. The urethral meatus is indicated by an asterisk.

Cystoscopic laser ablation of intramural EUs



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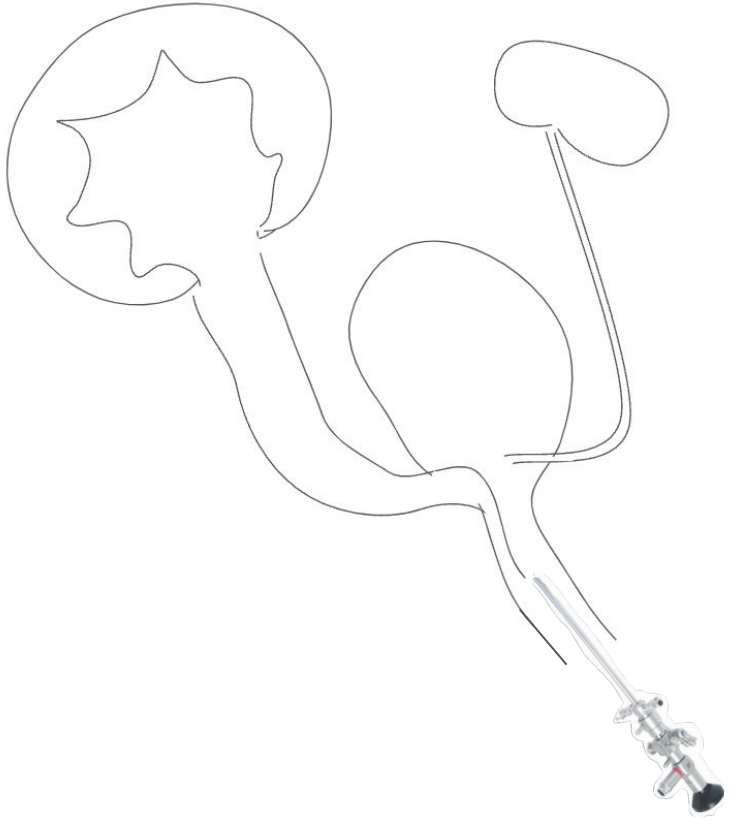
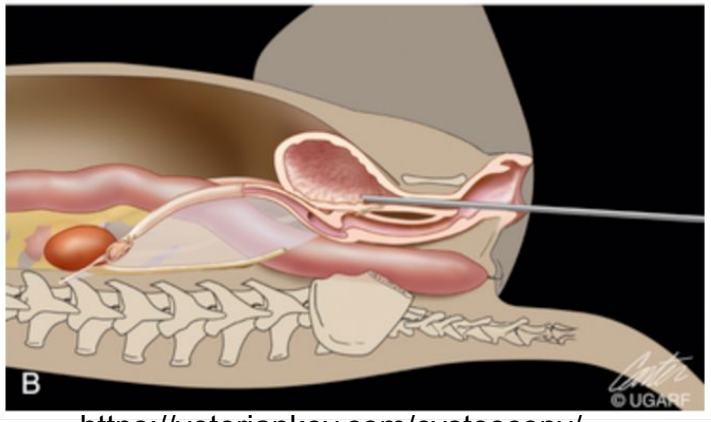


Cystoscopic laser ablation of intramural EUs



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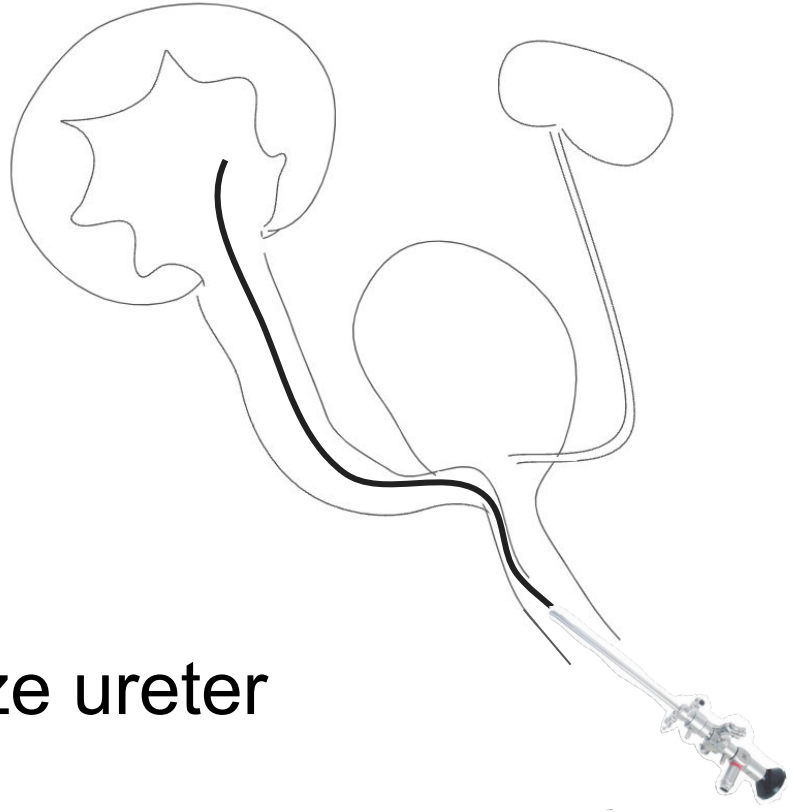
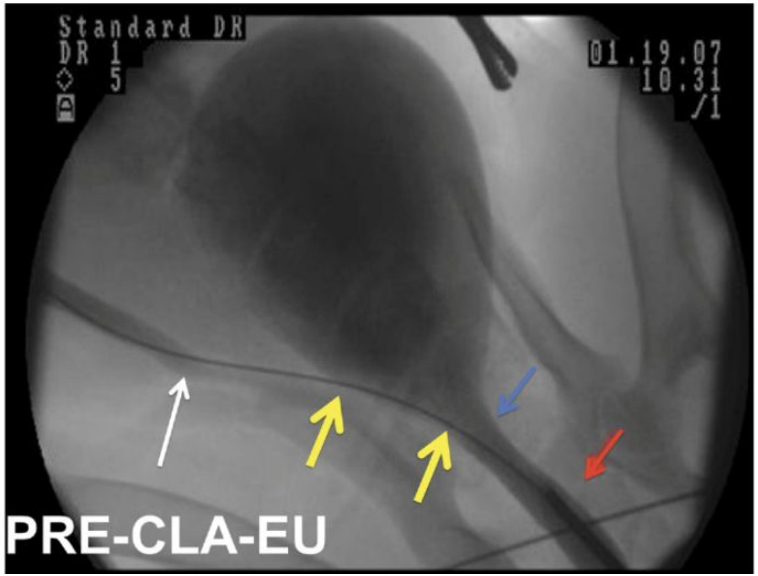
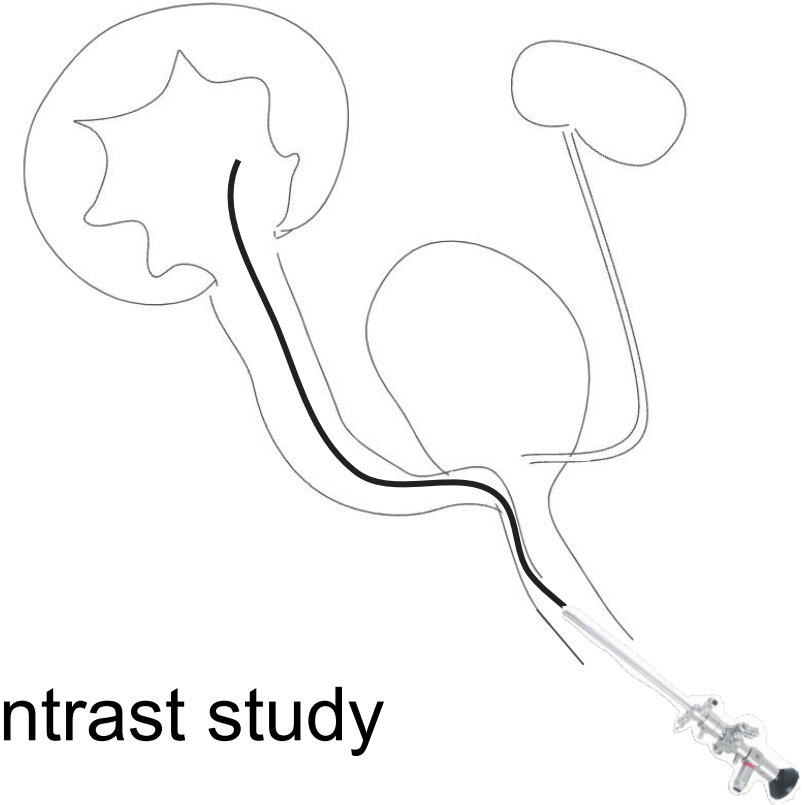


1. Catheterize ureter

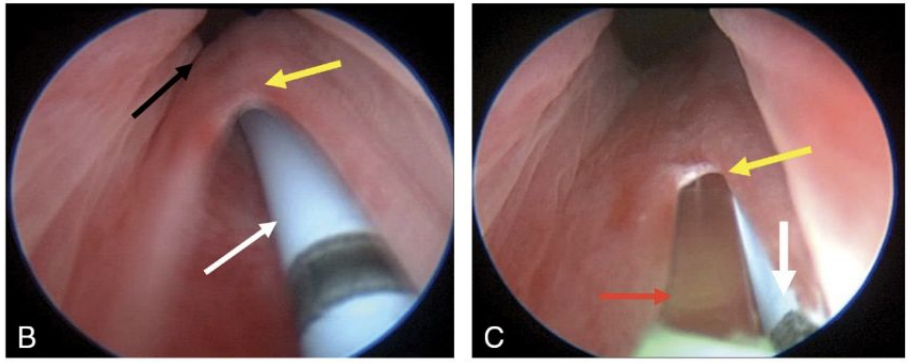
Cystoscopic laser ablation of intramural EUs

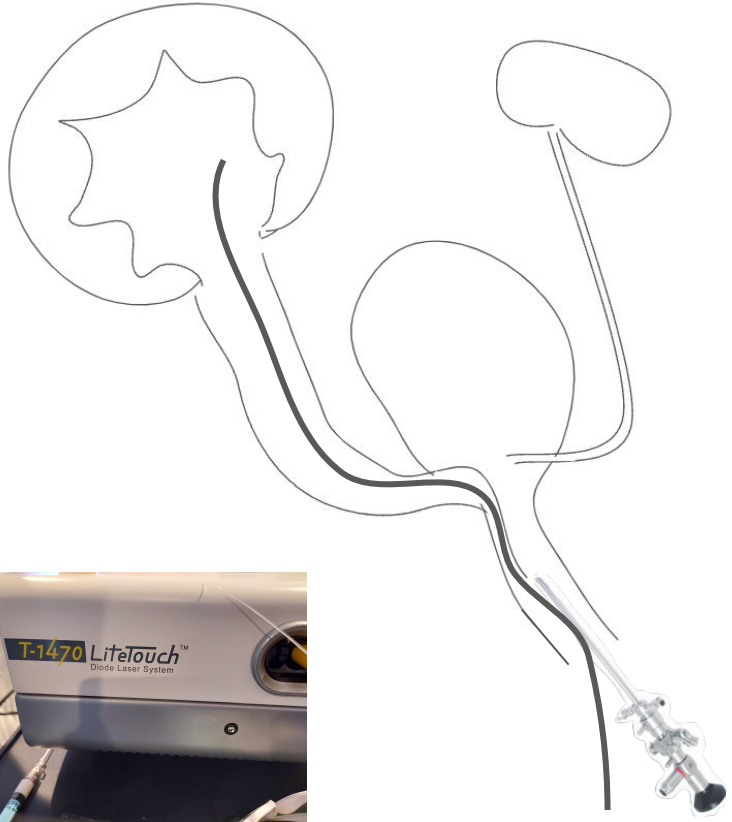




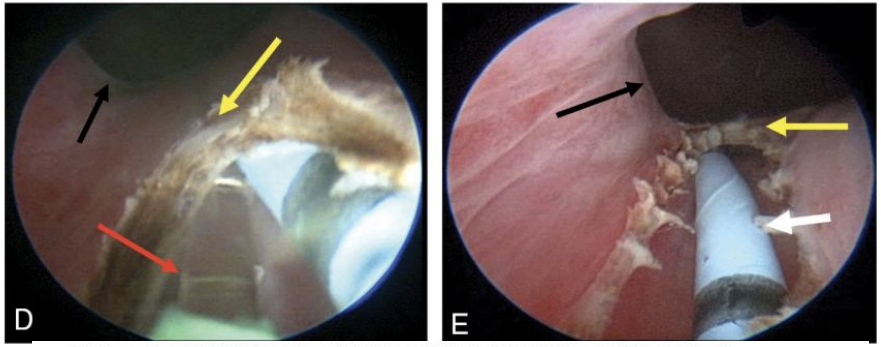
2. Contrast study

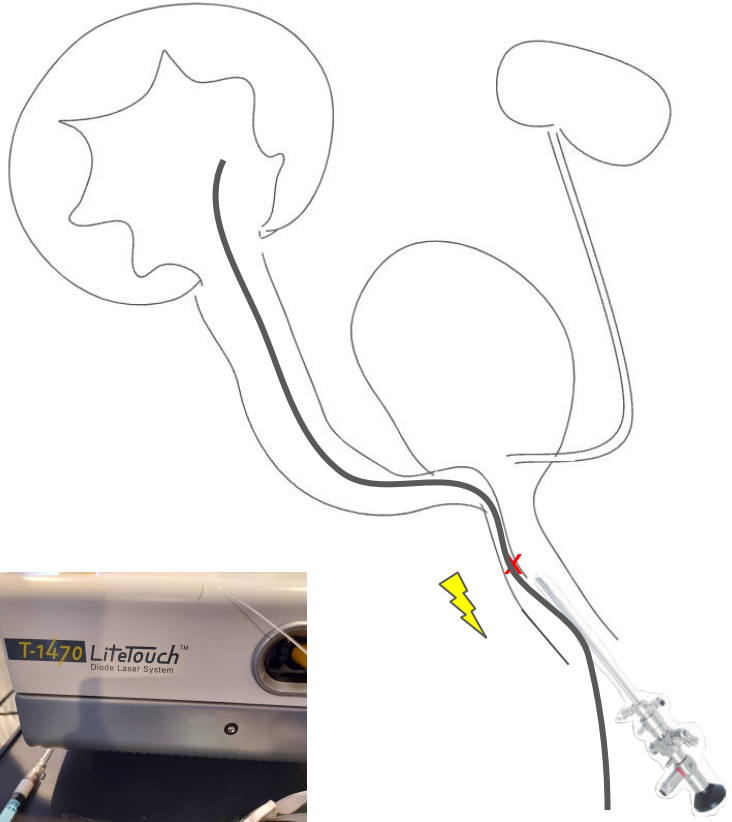
Cystoscopic laser ablation of intramural EUs



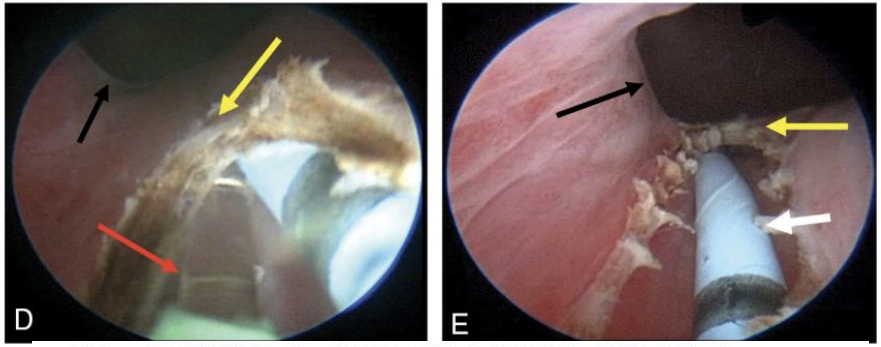


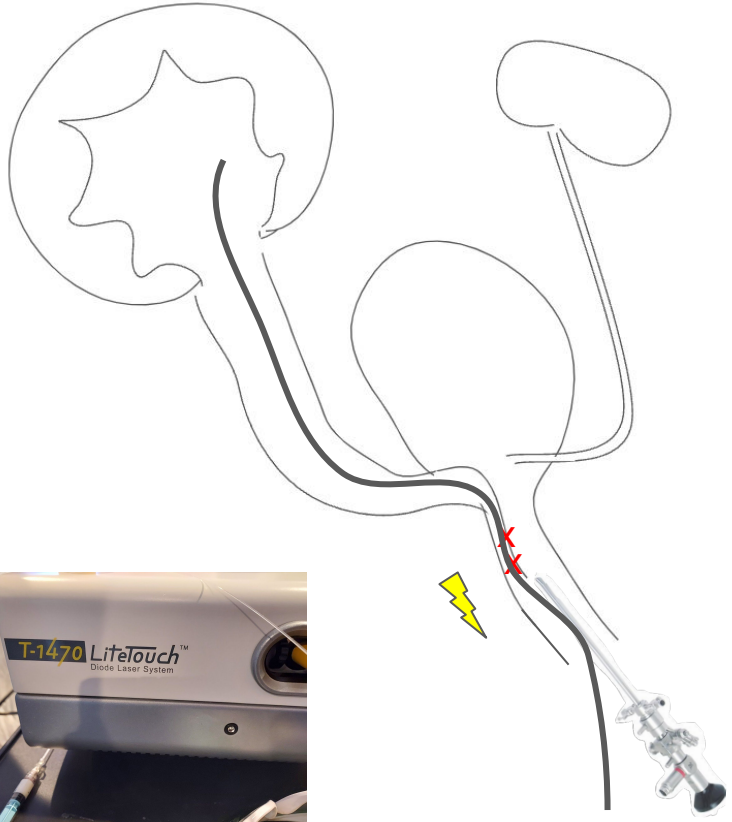
Cystoscopic laser ablation of intramural EUs





Cystoscopic laser ablation of intramural EUs





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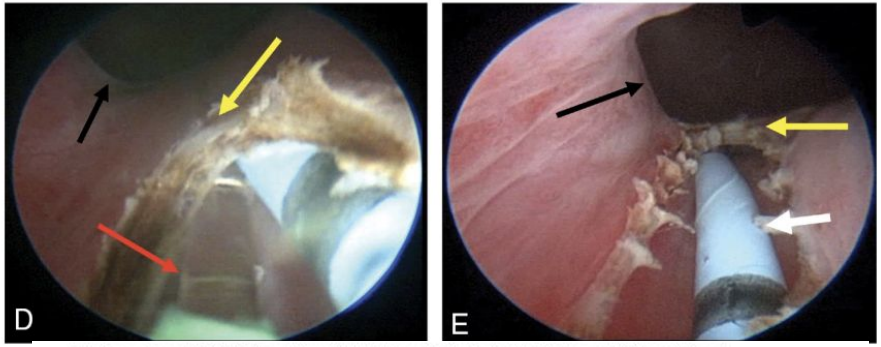

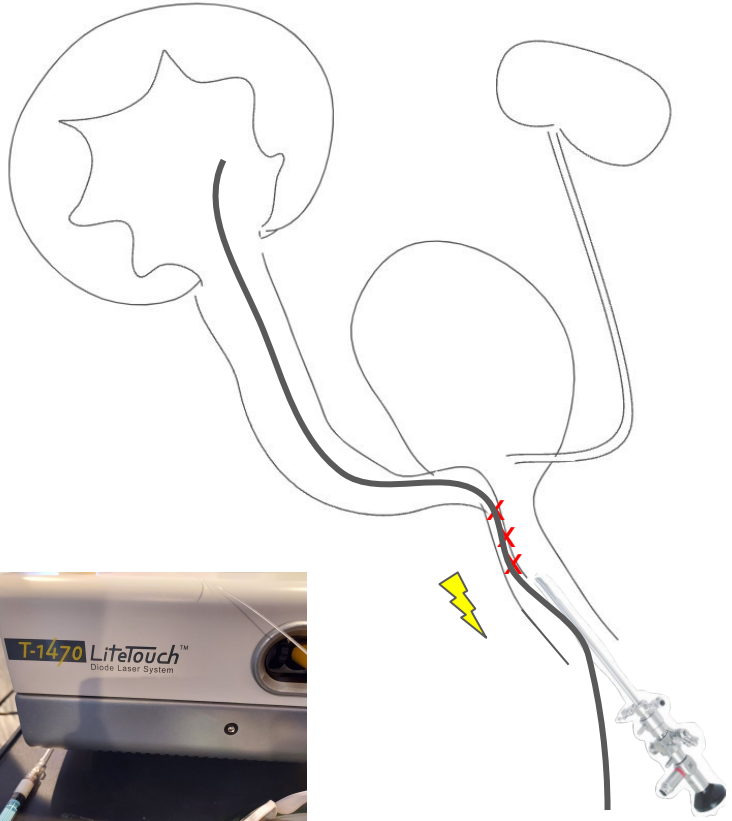

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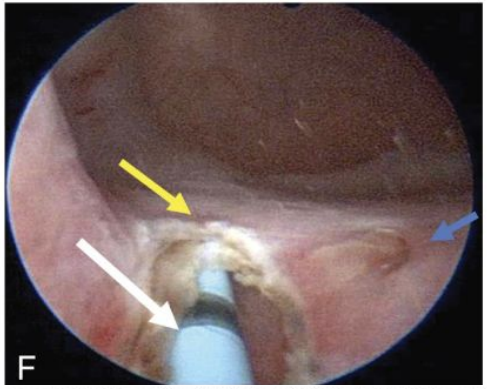
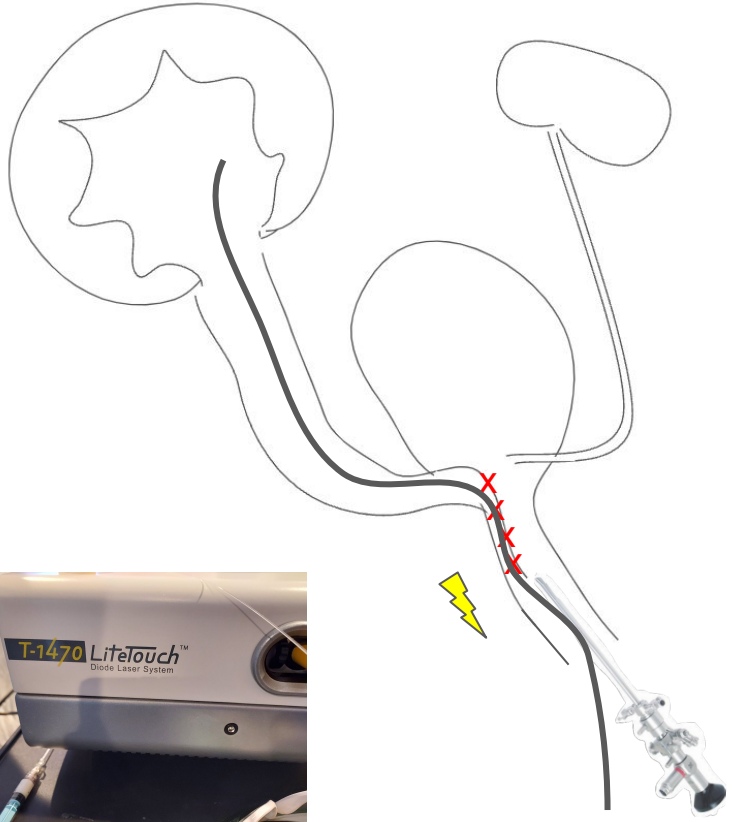
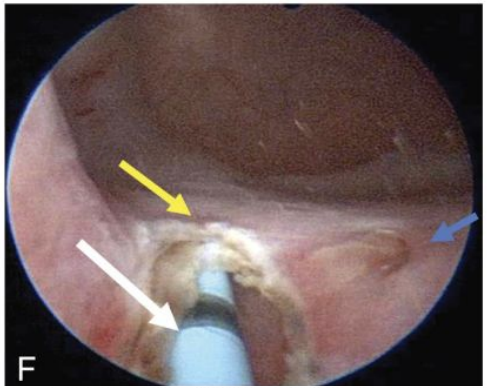
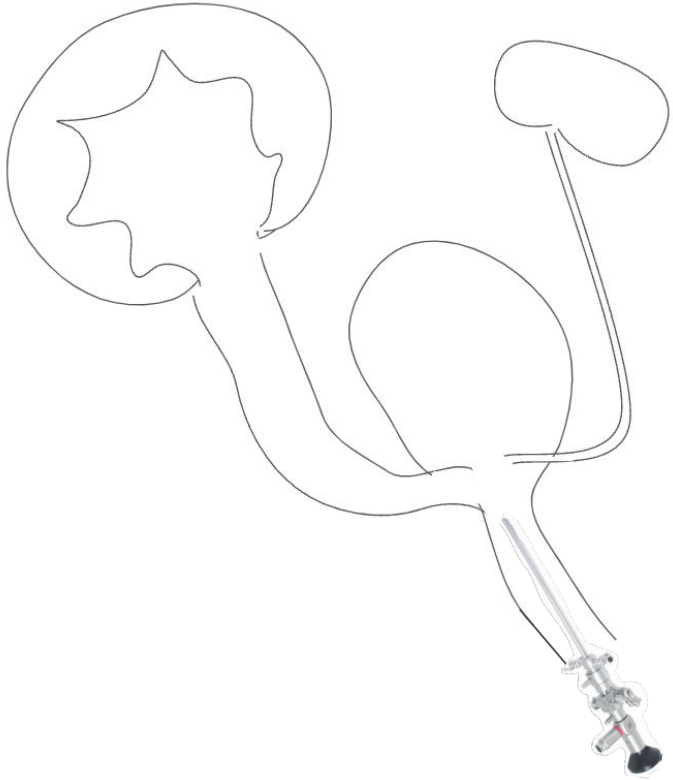




Cystoscopic laser ablation of intramural EUs





CLA-EU outcomes

Patient goes home that night, and calls elated the next day. No leaking at all!

CCVS
CAPE COD
VETERINARY
SPECIALISTS

CLA-EU outcomes

Patient goes home that night, and calls elated the next day. No leaking at all!

Don’t celebrate yet…
They are all continent for 24h post-procedure due to inflammation. Prepare owners.

CCVS
CAPE COD VETERINARY SPECIALISTS

CLA-EU outcomes

Evaluation of cystoscopic-guided laser ablation of intramural ectopic ureters in female dogs

JAVMA, Vol 240, No. 6, March 15, 2012

Allyson C. Berent, DVM, DACVIM; Chick Weisse, VMD, DACVS; Philipp D. Mayhew, BVM&S, DACVS; Kimberly Todd; Monika Wright; Demetrius Bagley, MD

In females:

- 23/30 77% continent
  - 47% **CLA** alone
  - 57% CLA + longterm **meds**
  - 77% CLA, +/- meds, +/- collagen, **hydraulic occluder**
- 7/30 23% persistently incontinent
  - Severe urethral dysplasia, intrapelvic bladder

Use of cystoscopic-guided laser ablation for treatment of intramural ureteral ectopia in male dogs: four cases (2006–2007)

JAVMA, Vol 232, No. 7, April 1, 2008

Allyson C. Berent, DVM, DACVIM; Philipp D. Mayhew, BVM&S, DACVS; Yael Porat-Mosenco, DVM

In males:

- 4/4 100% continent with CLA alone

CCVS CAPE COD VETERINARY SPECIALISTS

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In males:

- 4/4 100% continent with CLA alone

CLA-EU outcomes

- No major complications in studies, but possible complications include:
  - Minor bladder perforation -> ucath for 24 hours
  - Urethral perforation -> ucath for 5 days
  - Ureteral perforation -> temporary ureteral stent
  - Deep-seated infection/abscessation if laser is performed in the face of UTI.
- Other benefits
  - Day cases, nonsurgical
  - Minor discomfort managed with meloxicam
  - Can fix other defects while in there (laser ureteroceles, paramesonephric remnants, etc.)

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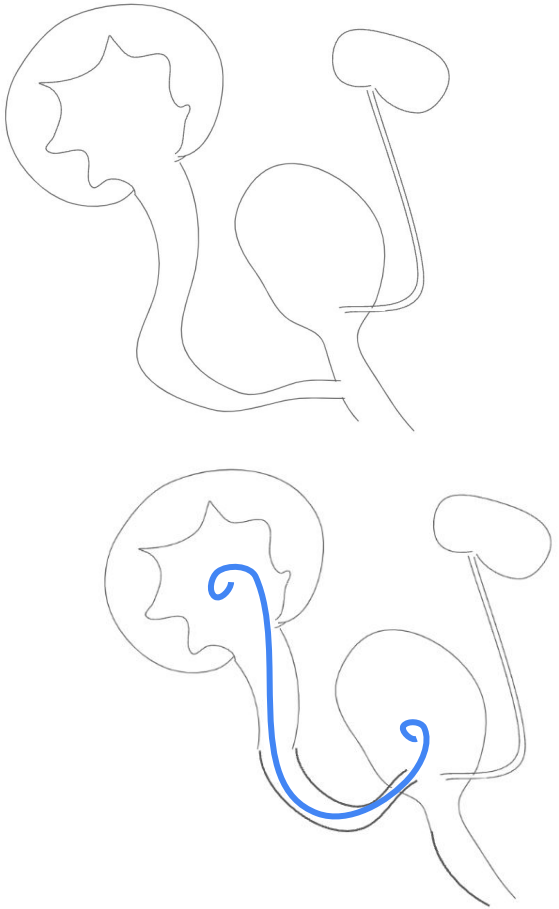
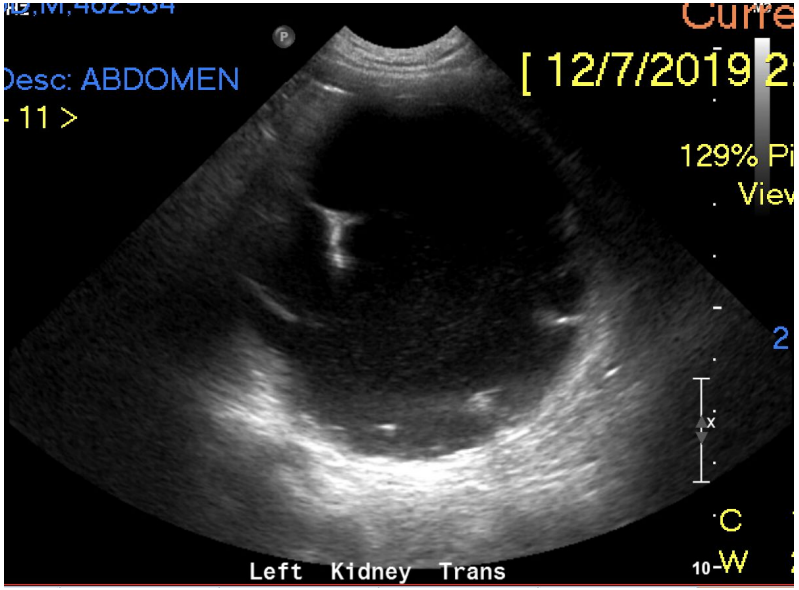
Surgical reimplantation of extramural EUs

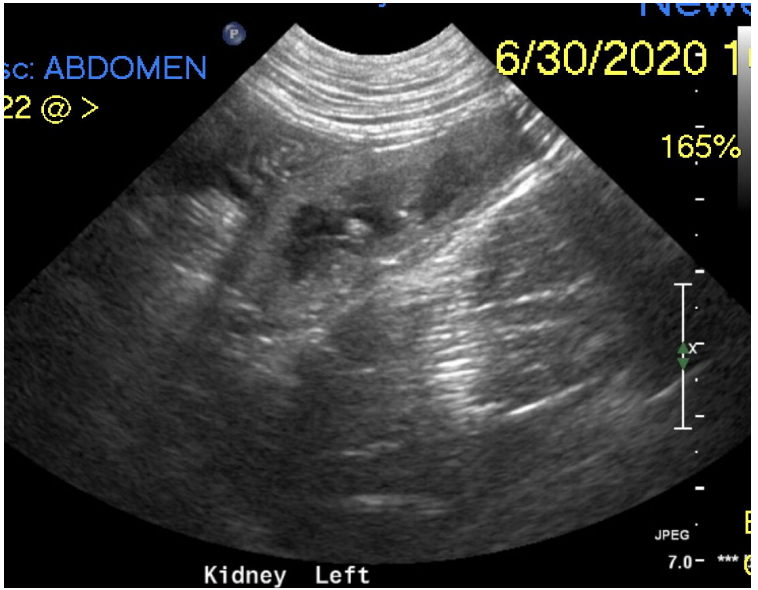
- Continence outcomes:
  - ~50% surgery alone
  - ~60% surgery + meds
  - ~70% + other surgical procedures (occluder, cystopexy, etc)
- Complications:
  - Stricture (~25%), consider stenting
  - Urine leakage, uroabdomen



Hydronephrosis before and after correction of EU

11mo CM Golden Ret





Ectopic ureter - take-aways

- Cystoscopy both for diagnosis & laser ablation
- Document clean UA/UC within a week prior to laser
- Hydronephrosis is common in EUs, will improve after addressing EUs
  - Nephrectomy is not indicated
- Set appropriate owner expectations
  - Likely will be better, but cannot guarantee they will be fixed, good chance will need to continue meds and may need additional procedures

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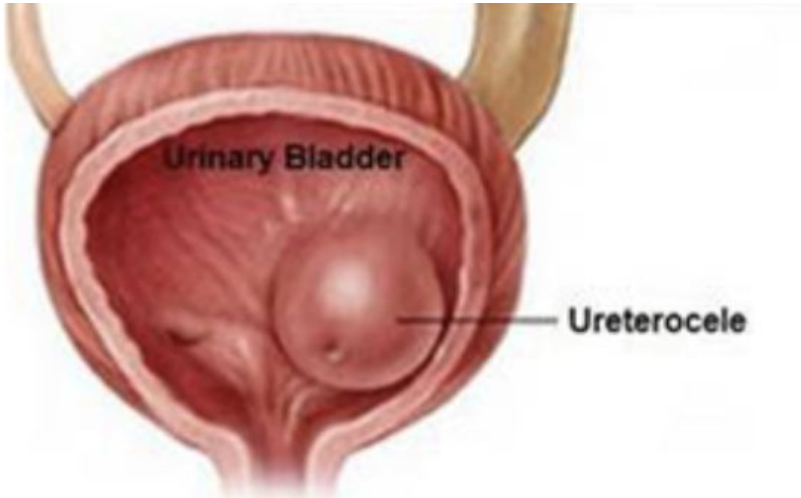
Other congenital malformations

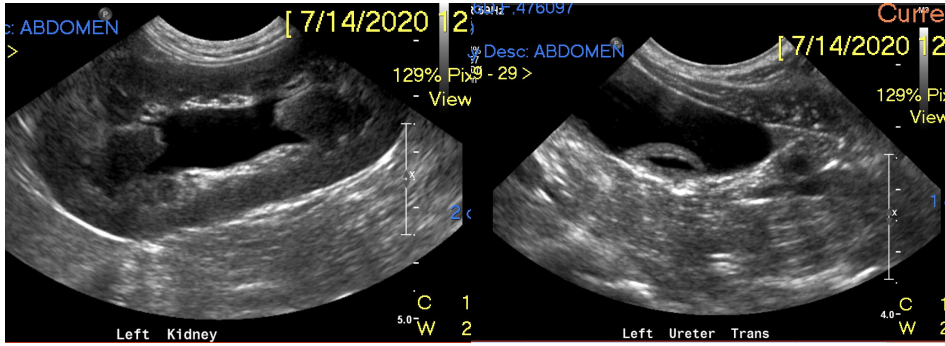
- Ureterocele
  - Cystic dilation of the terminal ureter, rare congenital condition
  - Orthotopic if ureteral orifice in normal position or ectopic if orifice is distal to normal position in the trigone
  - Clinically silent vs infections, incontinence, ureteral obstruction

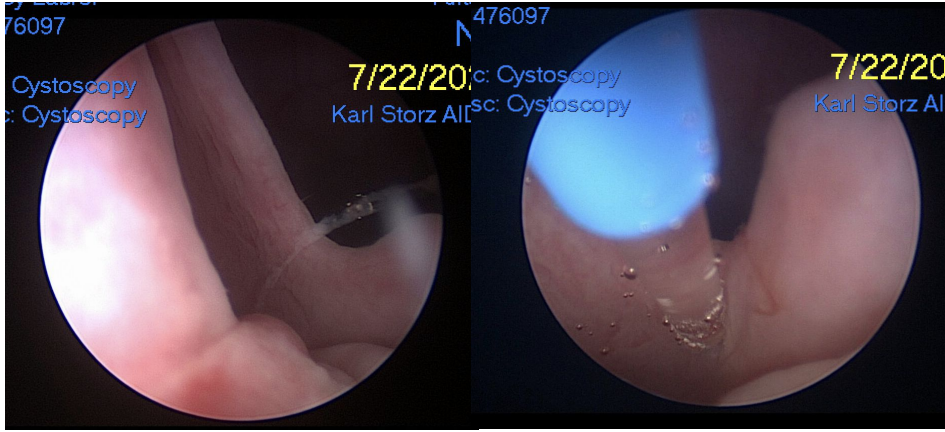


https://www.urologyhealth.org/urology-a-z/u/ureterocele

Other congenital malformations

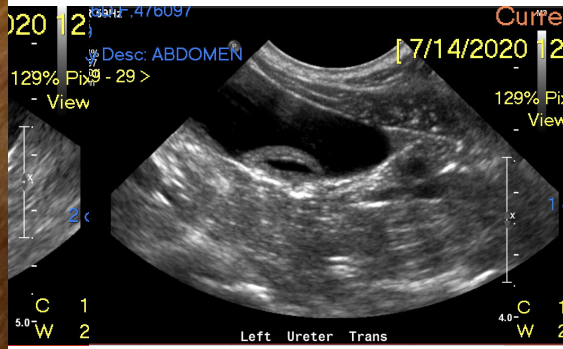
- Ureterocele
  - Zoe, 4mo F lab
  - PC: recurrent UTIs
  - Cystoscopy and laser ablation of ureterocele (neg UC within 1 week of procedure!!)
  - Hydronephrosis resolved within a couple months, no UTIs since

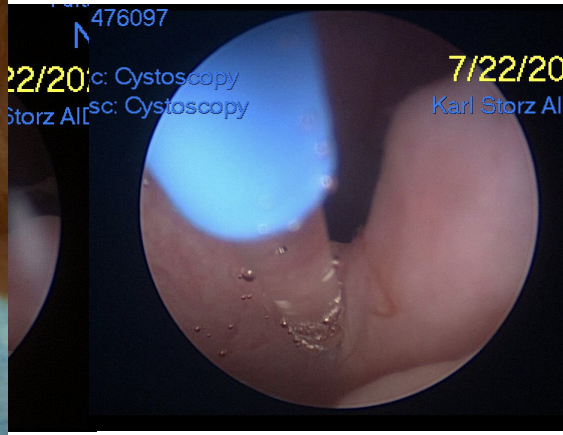




Other c nations

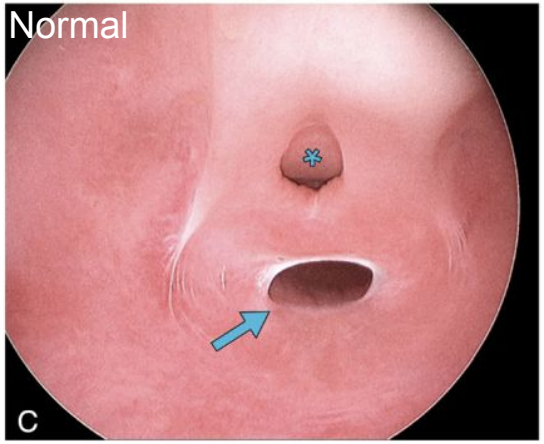
- Ureterocele
  - Zoe, 4mo F lab
  - PC: recurrent U
  - Cystoscopy and ablation of urete UC within 1 wee procedure!!)
  - Hydronephrosis within a couple UTIs since

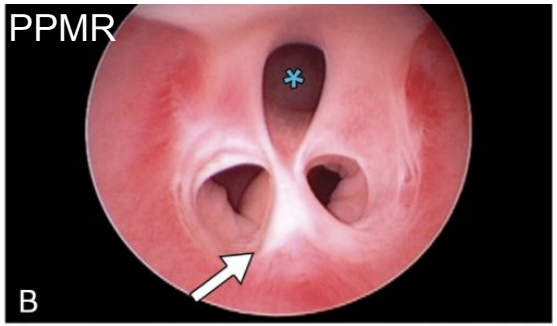




Other congenital malformations

- Persistent paramesonephric remnants
  - Fibrous bands running from dorsal urethra to dorsal vestibule
  - May be inconsequential, but potential pulling of urethra open, urine pooling, incontinence when changing positions, increased UTI risk
  - Can be laser ablated or manually broken down with scope





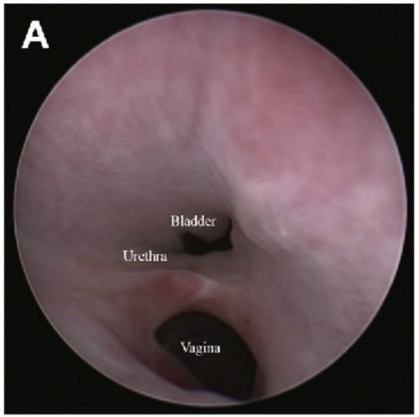
Other congenital malformations

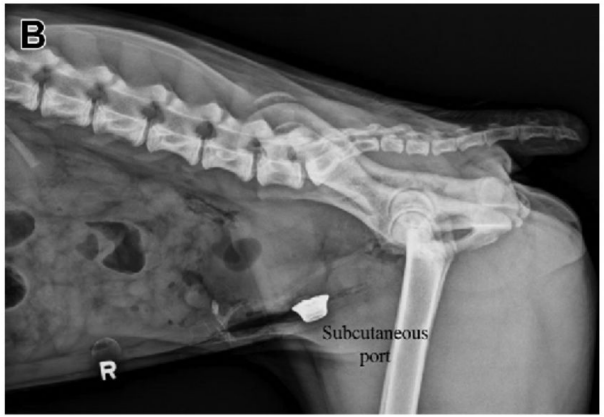
- Pelvic bladder
  - Bladder located in intrapelvic position
  - Partial intrapelvic location (trigone intrapelvic)may result in failure to empty due to lack of abdominal pressure
  - Complete intrapelvic location may result in failure to fill
  - Treated with urethropexy, cystopexy
  - Can be frustrating, pexy can sometimes worsen incontinence by pulling urethra taut

Yoon et al. 2014

Other congenital malformations

- Short/hypoplastic urethra
  - Can be very difficult to deal with this incontinence
  - Often fail medical management, consider hydraulic occluder

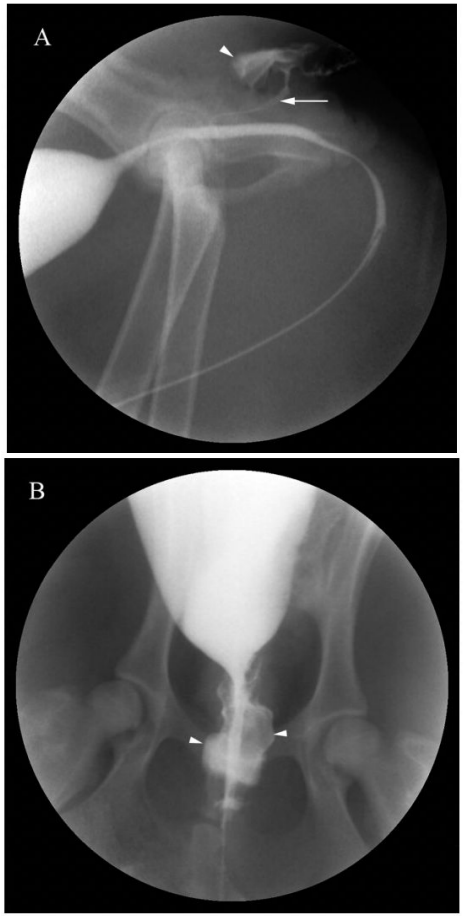




Bartges and Callens, 2015

Other congenital malformations

- Fistulas
  - Urethrorectal fistula
    - UTIs
    - Maybe Eng bulldog predisposition?
  - Vesicovaginal fistula
    - Severe, refractory incontinence (bladder not filling)
  - Tx: Surgical



Bula et al. 2016

Disorders of storage ✔

Disorders of voiding

- Urethral blockages: TCC, prostatic disease, urolithiasis, stricture, proliferative urethritis, FLUTD
- Detrusor atony
- Detrusor urethral dyssynergia

Mechanical blockages

- TCC
  - Diagnosis - **Cadet BRAF** (urine) vs traumatic catheterization vs endoscopic biopsies
  - NSAID (meloxicam) unless azotemic, prazosin, chemo
  - Urethral or ureteral stenting
- Prostatic disease
  - Intact - BPH, prostatic abscesses
  - Neutered - prostatic carcinoma
- Urolithiasis
- Stricture
  - Cystoscopy, balloon-dilation
- Proliferative urethritis
  - Cystoscopic urethral biopsies
  - Long courses of antiinflammatories, antibiotics
- FLUTD

CADET-BRAF (and BRAF PLUS) for TCC/UC

- Antech
- B-raf mutation
- 40mL free catch urine
  - Can be collected over 2-3 days
  - Placed in provided container with medium
- Sensitivity 85%, >95% with BRAF PLUS
- Specificity >99.5%

Detrusor atony

- Overdistension vs neurologic lesion (S1-S3, pelvic n)
- Distended, flaccid bladder that is easily expressed
- Overflow incontinence
- Treatment:
  - Relieve obstruction or otherwise address primary cause
  - Indwelling ucath for 7-14 days, with goal to keep bladder as small as possible to reestablish tight junctions
  - Daily ucath care, monitor UA/UC
  - Prazosin, starting dose in dogs: 1mg/15kg q8-12h
  - Bethanechol, starting dose in dogs: 0.25mg/kg q8-12

Detrusor urethral dyssynergia

- Functional obstruction
  - Insufficient relaxation of the urethral sphincter at time of detrusor contraction
- Large breed, male dogs
- Initiation of voiding, abruptly interrupted stream, stranguria
- Definitive diagnosis requires urethral pressure profilometry (UPP), but typically diagnosis of exclusion

Detrusor urethral dyssynergia

- Diagnostics
  - Physical exam, including rectal exam and thorough neurologic exam
  - Observe urine stream, AFAST bladder afterwards
  - Urinary catheterization to rule out mechanical obstruction
  - CBC/Chem
  - UA/UC
  - Abdominal ultrasound
  - +/- Cystoscopy
    - R/o granulomatous urethritis, deep-seated infections, 1-way-valve effect masses
  - +/- LS MRI
    - Lumbosacral stenosis (similar breeds), tethered cord syndrome

Detrusor urethral dyssynergia

- Medical management
  - Smooth muscle relaxants
    - Prazosin start at 1mg/15kg q8-12
    - Tamsulosin
    - Phenoxybenzamine
  - Skeletal muscle relaxants
    - Diazepam start at 0.2mg/kg q8-12
  - Parasympathomimetic
    - Only when we are sure urethra is adequately relaxed
    - Bethanechol start at 0.25mg/kg q8-12
- Teach owners to catheterize male dogs for flares

Detrusor urethral dyssynergy in dogs: 35 cases (2007-2019)

Journal of Small Animal Practice • Vol 62 • June 2021

C. Stilwell[1,*], J. Bazelle[†], D. Walker[‡], G. Stanzani* and J. Florey*

- 31 males, 4 females, large breeds (labs, GRs, mixes)
- Response to medical management
  - Good 60%, partial 20%, poor 20%
- Time to response = median 11 days
  - Be patient…

Table 5. Summary of medications administered to the 35 dogs with DUD

Drug	n (% total population)	Dose
Smooth muscle relaxant	33 (94.3)	
Prazosin	17 (48.6)	0.5–3 mg/dog, PO, q8-12h
Phenoxybenzamine	19 (54.2)	0.24–1.8 mg/kg/day, PO, divided q8-24h
Tamsulosin hydrochloride	3 (8.6)	400 mcg/dog, PO, q24h
Skeletal muscle relaxant	17 (48.9)	
Dantrolene	10 (28.6)	1–2.7 mg/kg/day, PO, divided q8-12h
Diazepam	8 (22.9)	0.04–0.8 mg/kg/day, PO, divided q8-12h
Parasympathomimetic		
Bethanechol	13 (37.1)	2.5–25 mg/dog, PO, q8-24h
NSAID	12 (34.2)	
Meloxicam	7 (20.0)	0.1 mg/kg, PO, q24h
Carprofen	2 (5.7)	1–3.2 mg/kg, PO, divided q12-24 h
Robenacoxib	1 (2.9)	1 mg/kg, PO, q24h
Prednisolone	1 (2.9)	1 mg/kg, PO, q24h
Chemical castration	5 (14.2)	
Osaterone acetate	2 (5.7)	0.3 mg/kg, PO, q24h for 7 days
Delmadinone acetate	3 (8.6)	1 mg/kg, SC, once

PO per os, q Frequency, NSAID Non-steroidal anti-inflammatory, SC Subcutaneous injection.

Detrusor urethral dyssynergy in dogs: 35 cases (2007-2019)

Journal of Small Animal Practice • Vol 62 • June 2021

C. Stilwell[1,*], J. Bazelle[†], D. Walker[‡], G. Stanzani[*] and J. Florey[*]

- Medications d/c in 11/20 55% of dogs with good response, 2 relapsed
- 4/34 underwent surgery (4 castration, 2 cystotomy tubes)
- 3/34 euth due to inadequate response to meds

CASE

Zeus, 8mo IF pseudohermaphrodite

- 5/6 puppies in litter were pseudohermaphrodites, 2 incontinent
  - Bitch had been supplemented with progesterone during pregnancy
- Sold as a suspected cryptorchid male
- Urine dribbling esp with change of position, but able to voluntarily void

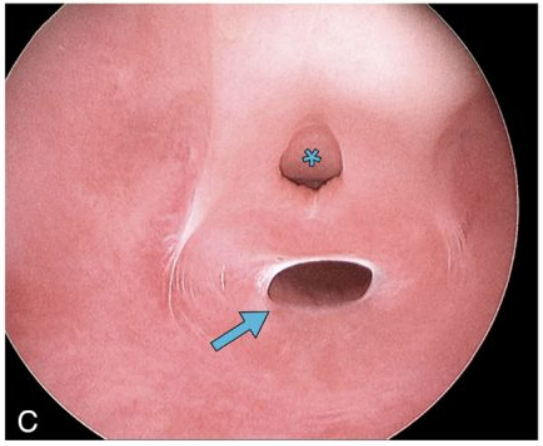
CASE

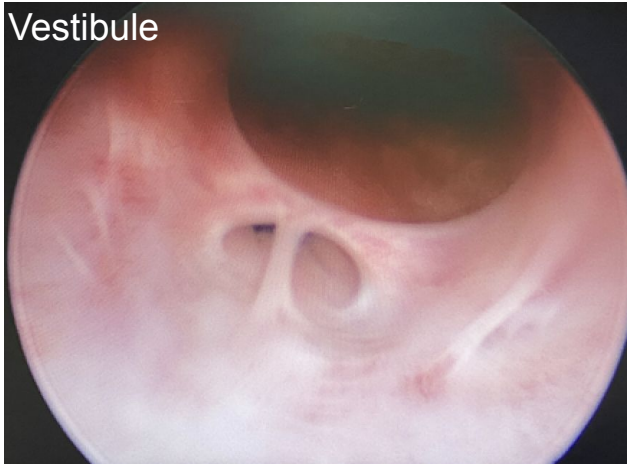
- CBC/Chem, UA/UC WNL
- CT scan with contrast at Pieper:
  - No testicles visible, but uterus and ovaries present
  - No obvious extramural ectopic ureters, but can’t rule out intramural
  - Some abnormal contrast extending to uterus/vagina

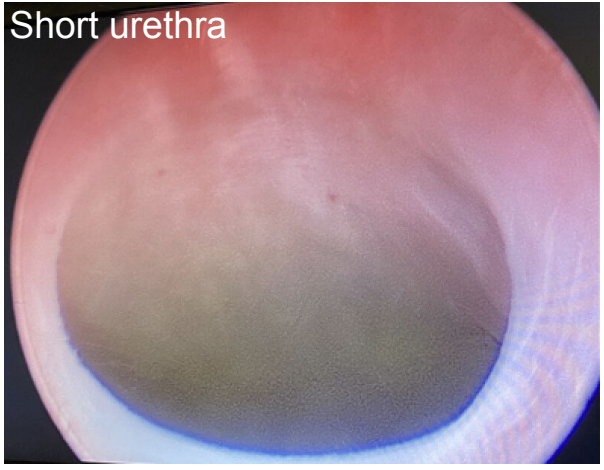
CASE

- Cystoscopy
  - Tiny paramesonephric remnant
  - Short/hypoplastic urethra
  - No evidence of ectopic ureters or fistulas to repro tract

Compare to normal urethra!!







CASE

- Failed medical management with PPA
- Hydraulic occluder placed at 11 months
- Better, but still sleeps in crate on pee pads

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QUESTIONS?

Feel free to email any questions to
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